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Alaska Pulp Corporation Long-Term Timber Sale Contract

North and East Kuiu Final Environmental Impact Statement

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Alaska Pulp Corporation Long-Term Timber Sale Contract

North and East Kuiu

Final Environmental Impact Statement

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Abstract: The U.S. Forest Service proposes a range of alternatives for making timber volume available to the Alaska Pulp Corporation Long-term Timber Sale Contract. Alternative 1 is the no action alternative. Alternative 2 focuses activities in areas of previous timber harvest (north Kuiu) while Alternative 3 focuses activities away from areas of recent timber harvest (east Kuiu). Alternative 4 disperses activities across the study area.

Table of Contents

Purpose and Need	1-1
Introduction	1-1
Background	1-2
Proposed Action	1-3
Project Area	1-4
Purpose and Need.....	1-7
Selection of Project Area.....	1-7
Management Direction.....	1-8
Current Management	1-8
Desired Future Condition.....	1-9
Desired Future Environmental Condition	1-9
Desired Future Economic Conditions	1-10
Desired Future Social Conditions	1-11
Decision to be Made.....	1-11
Public Review and Comment.....	1-12
Scope of the Analysis.....	1-12
Issues Outside the Scope of this Analysis	1-14
No Action Alternative	1-15
Approvals Required From Other Agencies	1-16
Major Legislation Relating to the EIS:	1-17
Coastal Zone Management Act of 1976 (CZMA):.....	1-17
Alternatives	2-1
Introduction	2-1
Alternative Development Process.....	2-1
Alternatives Considered But Eliminated From Detailed Study	2-9
Direction Common to All Alternatives.....	2-10
Alternatives Considered in Detail	2-12
Acres Managed to Provide Old-Growth Habitat Conditions.....	2-24
Mitigation Measures Used in All Action Alternatives	2-29
Comparison of Alternatives	2-30
Effects Comparison.....	2-31
Issue Comparison	2-40
Identification of the Forest Service Preferred Alternative.....	2-51
Environment and Effects.....	3-1
Introduction	3-1
Setting.....	3-3
Threatened and Endangered Plant Species	3-3
Management	3-4

Table of Contents

Socio-Economic Setting.....	3-5
Impact Area	3-5
Population.....	3-5
Major Industries.....	3-5
Community Profiles	3-6
Land Status	3-8
Facilities	3-8
Transportation	3-8
Log Transfer Facilities	3-10
Logging Camps	3-10
Administrative Sites	3-11
Cultural Resources.....	3-12
Affected Environment.....	3-12
Environmental Effects.....	3-17
Cumulative Effects	3-21
Economics	3-22
Affected Environment.....	3-22
Economic Impacts.....	3-22
Efficiency Analysis	3-23
Environmental Effects.....	3-25
Economic Impacts.....	3-26
Cumulative Effects	3-29
Fisheries.....	3-31
Affected Environment.....	3-31
Management Indicator Species (MIS)	3-31
Fish Production and Harvest	3-32
Prior Timber Harvest.....	3-34
Class I Streams	3-34
Class II Streams	3-36
Road Crossings.....	3-39
Fish Habitat Enhancement	3-39
Environmental Effects.....	3-41
Timber Harvest Effects.....	3-41
Roads	3-47
Habitat Capability for Fish Management	
Indicator Species (MIS).....	3-48
Cumulative Effects	3-49

Table of Contents

Marine Environment	3-50
Affected Environment.....	3-50
Environmental Effects.....	3-54
Recreation	3-59
Affected Environment.....	3-59
Supply	3-60
Recreation Places	3-61
Wild and Scenic Rivers and Special Interest Areas.....	3-69
Environmental Effects.....	3-70
Supply	3-70
Impacts to Recreation Places	3-72
Effects to Use and Demand	3-77
Effects to Wild and Scenic Rivers and Special Interest Areas	3-78
Cumulative Effects	3-79
Soils.....	3-82
Affected Environment.....	3-82
Wetlands	3-84
Floodplains	3-84
Caves.....	3-84
Environmental Effects.....	3-85
Soil Productivity	3-85
Soil Erosion	3-85
Wetlands	3-87
Floodplains	3-88
Cumulative Effects	3-89
Subsistence	3-90
Affected Environment.....	3-90
Historical Tlingit Clan Hunting Boundaries	3-91
Communities With Subsistence Uses Within The Project Area..	3-92
Environmental Effects.....	3-100
ANILCA Section 810 Subsistence Evaluation Process	3-100
FEIS Evaluation.....	3-101
FEIS Findings	3-102
Subsistence Use Area	3-103
Deer Effects and Evaluation.....	3-105
Wildlife Effects and Evaluation	3-110
Fish and Shellfish Effects and Evaluation.....	3-114

Table of Contents

Other Foods Effects and Evaluation.....	3-116
Marine Mammals Effects and Evaluation.....	3-118
Timber Effects and Evaluation.....	3-118
Direct, Indirect, and Cumulative Effects.....	3-118
Displacement of Subsistence Users.....	3-120
Subsistence Determinations	3-120
Final EIS Conclusions	3-122
ANILCA 810 Hearing Summary and Meeting with Southeast Native Subsistence Commission.....	3-123
Timber	3-124
Affected Environment	3-124
Plant Communities	3-124
Natural Forest Succession	3-126
Commercial Forest Land.....	3-127
Proportion of Volume Classes 6 and 7	3-129
Operable and Inoperable CFL	3-129
Stand Management.....	3-130
Existing Condition.....	3-130
Timber Harvested	3-130
Environmental Effects.....	3-131
Stand Harvest.....	3-131
Succession of Managed Stands	3-136
Yarding Methods	3-137
Proportion of Harvest Acres by Volume Class Strata	3-140
Regeneration	3-143
Precommercial Thinning	3-143
Commercial Thinning.....	3-143
Stand Growth and Yield	3-143
Projected Harvest Through Year 2011	3-143
Tongass Timber Reform Act	3-144
Visual Resource	3-146
Affected Environment.....	3-146
Visual Management System	3-146
Sensitivity Levels	3-146
Variety Class	3-146
Distance Zones	3-147
Visual Quality Objectives (VQOs).....	3-147
Existing Visual Condition (EVC).....	3-148

Table of Contents

Summary of the Visual Design Process	3-149
Landscape Characteristics by VCU and Visual Change by Alternative	3-150
Summary of Environmental Effects.....	3-161
Cumulative Visual Effects	3-162
Watershed	3-165
Affected Environment.....	3-165
Streamflow.....	3-165
Water Quality	3-165
Sediment	3-165
Stream Temperature.....	3-167
Cumulative Watershed Effects	3-167
Environmental Effects.....	3-168
Streamflow.....	3-168
Water Quality	3-168
Sediment	3-169
Stream Temperature.....	3-170
Cumulative Watershed Effects	3-170
Wildlife	3-174
Affected Environment.....	3-174
Wildlife Habitats	3-175
Habitat Descriptions	3-177
Wildlife Species.....	3-183
Management Indicator Species	3-183
The Role And Reliability Of HSI Estimates	3-184
Use Of The Model For Alternative Comparison	3-185
The Relationship Between Habitat Capability And Future Populations	3-185
Indicator Species Descriptions	3-185
Other Species of Concern.....	3-190
Threatened or Endangered Species.....	3-191
Sensitive Species	3-191
Special Emphasis Species	3-191
Environmental Effects.....	3-193
Direct Effects on Wildlife Habitat.....	3-193
Direct Effects on Habitat Capability	3-197
Effects on Old-Growth Habitat (Biodiversity).....	3-201
Other Species of Interest	3-202

Table of Contents

Cumulative Effects	3-203
Wildlife Habitats.....	3-203
Wildlife Species.....	3-206
Other Environmental Considerations.....	3-208
Chapter 4 - List of Preparers	4-1
Chapter 5 - Listing of Document Recipients	5-1
Chapter 6 - Glossary.....	6-1
Chapter 7 - Literature Cited	7-1
Chapter 8 - Index	8-1
Appendix A - Unit Plans and Road Descriptions	
Appendix B - TRUCS Maps	
Appendix C - Monitoring and Implementation	
Appendix D - No Name LTF Analysis	
Appendix E - Units Over 100 Acres	
Appendix F - Rationale Supporting Scheduling of the North and East Kuiu Project Area	
Appendix G - Public Comments and Responses	
Appendix H - Interim Goshawk Guidelines	
Appendix I - Silvicultural Alternatives to Clearcutting in Southeast Alaska	
Appendix J - Potential Sale Area Improvement Projects	
Appendix K - Subsistence Hearing Testimony	
Appendix L - Portage Routes	
Appendix M - Proportionality Direction	

List of Tables

Table Number	Table Title	Page Number
-----------------	-------------	----------------

Chapter 2

2-1	Proposed Timber Harvest Units for Alternative 2	2-15
2-2	Proposed Timber Harvest Units for Alternative 3	2-18
2-3	Proposed Timber Harvest Units for Alternative 4	2-22
2-4	Acres Managed to Provide Old-Growth Habitat Conditions.....	2-25
2-5	Volume by Alternative	2-31
2-6	Proposed Forest Development Roads in Miles.....	2-31
2-7	Summary Comparison of Alternatives.....	2-32
2-8	Employment Impacts.....	2-42
2-9	Timber Cost and Value Summary	2-43
2-10	Miles of Stream Buffer and AHMU Class by Alternative	2-44
2-11	Acres of Proposed Harvest by Soil Hazard Class.....	2-45
2-12	Miles of Proposed Road by Soil Hazard Class	2-46
2-13	Acres of CFL to be Harvested by Action Alternative	2-47
2-14	Percent of Volume Class Strata Proportionality in Alternatives	2-48

Chapter 3

3-1	Cumulative Timber Harvest by 2011	3-3
3-2	Miles of Existing Forest Development Roads	3-9
3-3	Log Transfer Facility Status	3-10
3-4	Cultural Resource Sites	3-13
3-5	Cultural Resource Surveys in the Kuiu Island Study Area	3-15
3-6	Cultural Resource Survey Areas and Results	3-20
3-7	Revenue and Expenses; Tongass NF Timber Sale Program	3-24
3-8	Present Value of Costs and Benefits; Tongass NF Timber Sale Program.....	3-25
3-9	Employment Impacts	3-26

Table of Contents

Table Number	Table Title	Page Number
3-10	Income Produced by Alternative.....	3-26
3-11	Timber Cost and Value Summary	3-29
3-12	Average Annual Weight of Salmon Available for Commercial Harvest	3-32
3-13	Miles of Stream by Stream Class	3-34
3-14	Acres of Riparian Area with Prior Timber Harvest Near Class I Streams	3-35
3-15	Percent of Class I Riparian Area Harvested	3-36
3-16	Acres of Riparian Area with Prior Timber Harvest Near Class II Streams	3-37
3-17	Percent of Class II Riparian Area Harvested	3-38
3-18	Number of Road Crossings on Class I and II Streams by VCU at Present	3-39
3-19	Miles of Stream Buffer by VCU and AHMU Class for Alternative 2	3-42
3-20	Miles of Stream Buffer be VCU and AHMU Class for Alternative 3	3-43
3-21	Miles of Stream Buffer by VCU and AHMU Class for Alternative 4	3-44
3-22	Miles of Class III Streams Within or Bordering Units	3-46
3-23	Number of Road Crossings by Alternative.....	3-47
3-24	Comparison of LTF Locations to the 10 Siting Guidelines	3-56
3-25	ATTf LTF Siting Guidelines.....	3-57
3-26	Recreation Opportunity Spectrum Acres	3-61
3-27	Cabin and Trail Visitor Use.....	3-68
3-28	Change in ROS Class by Alternative	3-72
3-29	Recreational Setting of Recreation Places Resulting from Alternatives	3-73
3-30	Recreation Opportunity Spectrum (ROS) Acres	3-76
3-31	Distribution of Soil Hazard Classes	3-83
3-32	Existing Managed Stands by Soil Hazard Class.....	3-83
3-33	Distribution of Wetlands	3-84
3-34	Acres of Proposed Harvest by Soil Hazard Class	3-86
3-35	Miles of Proposed Road by Soil Hazard Class	3-87
3-36	Acres of Proposed Harvest on Wetlands.....	3-87

Table Number	Table Title	Page Number
3-37	Proposed Specified Road on Wetlands	3-88
3-38	Cumulative Wetland Impacts	3-88
3-39	Roads and Timber Harvest on Floodplains.....	3-89
3-40	Demographic Data on Communities Identified as Using the Project Area	3-93
3-41	Mean Per Capita Edible Pounds Harvested in 1987	3-95
3-42	Proposed Timber Harvest Units in Subsistence Use Areas.....	3-104
3-43	Total Acres Used Within the Study Area by Community	3-106
3-44	Significant Possibility of a Significant Restriction of Deer.....	3-110
3-45	Significant Possibility of a Significant Restriction of Wildlife Resources	3-114
3-46	Significant Possibility of a Significant Restriction of Subsistence Use of Fish Resources.....	3-116
3-47	Significant Possibility of a Significant Restriction of Subsistence Use of Other Food Resources	3-118
3-48	Proposed Future Timber Sale Projects on the Stikine Area Within or Near the Study Area.....	3-120
3-49	Acres of Forest Type	3-128
3-50	Proportional Volume Class Strata Summary	3-129
3-51	Previous Harvest by Management Area	3-131
3-52	Acres of CFL to be Harvested by Alternative 2	3-132
3-53	Acres of CFL to be Harvested for Alternative 3.....	3-133
3-54	Acres of CFL to be Harvested by Alternative 4	3-134
3-55	Net Sawlog and Utility Volume by Alternative	3-135
3-56	Acres by Harvest System for Alternative 2	3-138
3-57	Acres by Harvest System for Alternative 3	3-139
3-58	Acres by Harvest System for Alternative 4	3-140
3-59	Percent of Volume Class Strata Proportionality in Alternatives.....	3-142
3-60	Acres of Inventoried Visual Quality Objectives	3-148
3-61	Existing Visual Condition	3-149
3-62	Acres of Future Visual Condition to be Achieved	3-160
3-63	Stream Process Groups.....	3-166
3-64	Cumulative Watershed Effects.....	3-170
3-65	Acres of Old-Growth Wildlife Habitats Prior to Recorded Timber Harvest and Existing as of 1992.....	3-176

Table of Contents

Table Number	Table Title	Page Number
3-66	Percent of Various Old-Growth Wildlife Habitats Remaining Through 1991	3-177
3-67	Old-Growth Habitat Blocks	3-180
3-68	Estimates of Old-Growth Patch Size for Selected Species.....	3-182
3-69	Management Indicator Species	3-183
3-70	Habitat Capability - Present Condition by VCU	3-187
3-71	Densities of Marbled Murrelets Detected Throughout the Stikine Area in 1991	3-192
3-72	Acres of Beach Fringe Habitat in Productive Old-Growth by Alternative	3-194
3-73	Acres of Estuary Fringe Habitat in Productive Old-Growth by Alternative	3-195
3-74	Acres of Streamside Riparian and Oversteepened Slope Habitat in Productive Old-Growth by Alternative.....	3-196
3-75	Acres of Forested Old-Growth Habitat by Alternative	3-197
3-76	Habitat Capability - Alternative 2 by VCU	3-198
3-77	Habitat Capability for Deer by WAA.....	3-198
3-78	Habitat Capability - Alternative 3 by VCU	3-199
3-79	Habitat Capability - Alternative 4 by VCU	3-200
3-80	Old Growth Block Acres.....	3-202
3-81	Percent of Various Wildlife Habitats Remaining Through 2011	3-204
3-82	Estimated Fuel Consumption	3-213

List of Figures

Figure Number	Figure Title	Page Number
--------------------------	---------------------	------------------------

Chapter 1

1-1	Project Area Vicinity Map.....	1-5
1-2	Management Area and VCU Boundaries	1-6

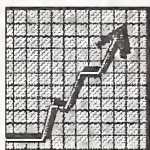
Figure Number	Figure Title	Page Number
Chapter 2		
2-1	Acres to be Managed to Provide Old-Growth Habitat Conditions - Alternative 2	2-26
2-2	Acres to be Managed to Provide Old-Growth Habitat Conditions - Alternative 3	2-27
2-3	Acres to be Managed to Provide Old-Growth Habitat Conditions - Alternative 4	2-28
Chapter 3		
3-1	Kuiu Island Land Use Designations.....	3-4
3-2	Pounds of Edible Subsistence Harvest Per Capita.....	3-94
3-3	Deer as a Percentage of Total Mean Edible Pounds of Subsistence Harvest.....	3-95
3-4	Estimated Deer Available for Harvest and Hunter Demand - WAA 5012.....	3-106
3-5	Estimated Deer Available for Harvest and Hunter Demand - WAA 5013.....	3-107
3-6	Estimated Deer Available for Harvest and Hunter Demand - WAA 5014.....	3-107
3-7	Estimated Deer Available for Harvest and Hunter Demand - WAA 5018.....	3-108
3-8	Projected Cumulative Harvest to 2011	3-145
3-9	Graphic Depiction of Units 400-8 and 21 as Seen from Security Bay	3-152
3-10	Graphic Depiction of Harvest Proposed in Alternatives 2, 3, and 4 as Seen from Inside Rowan Bay	3-154
3-11	Graphic Depiction as seen from Chatham Strait	3-154
3-12	Graphic Simulation of Unit 417-13 as Seen from the Anchorage Near "Fantasy Island"	3-156
3-13	Graphic Simulation of Unit 417-13 as Seen from the Middle of No Name Bay	3-157
3-14	Graphic Simulations of Units 420-46, 47, and 48 as Seen from Two Different Viewpoints in Port Camden.....	3-159
3-15	ADF&G Watersheds.....	3-173
3-16	Old-Growth Habitat Blocks	3-181

Table of Contents

Symbols have been used in this document to aid in tracking issues within Chapter 3. The symbols are defined below:



Issue 1: Cultural Resources



Issue 2: Economics



Issue 3: Fisheries



Issue 4: Marine Environment



Issue 5: Recreation



Issue 6: Soils



Issue 7: Subsistence



Issue 8: Timber



Issue 9: Visual Resource



Issue 10: Water Quality



Issue 11: Wildlife Habitat

Chapter 1

Purpose and Need

Purpose and Need

Introduction

This Environmental Impact Statement (hereafter referred to as EIS) describes three alternatives for timber harvest, road construction, and related activities to make timber on Kuiu Island available for harvest. These activities are necessary to meet the Federal Government's contractual obligations to the Alaska Pulp Corporation under the Long-Term Timber Sale Contract. A "no action" alternative is also presented and the agency's preferred alternative is identified. In addition to describing the alternatives, this EIS documents the analysis of the expected outputs and effects of the alternatives.

Organization of This Document

The remainder of this chapter summarizes background information, including management direction, to describe the need and basis for this project. It also describes the location of the project, the decision to be made, the issues which guided the planning process, and the permits and licenses needed to implement the project.

Chapter 2 - Alternatives describes the alternatives, the process used to develop the alternatives and the direction common to all of the alternatives. It also presents a summary comparison of the environmental consequences of each alternative (from Chapter 3).

Chapter 3 - Environment and Effects describes the existing environment that might be affected by implementing any of the alternatives described in Chapter 2 and predicts the effects that each alternative would have on each of the significant components of the environment.

Chapter 4 - List of Preparers lists the individuals who conducted the analysis and briefly describes their qualifications.

Chapter 5 - Document Recipients lists the individuals, groups, and agencies that requested copies of this document.

Chapter 6 - Glossary is located at the end of this document to aid readers unfamiliar with technical or agency terminology. It also explains abbreviations used in the EIS.

The **Appendices A through M** give more detailed analyses, information or documentation used in the analysis.

The public may also review the planning records at the Forest Supervisor's Office located at 15-12th Street, Petersburg, Alaska 99833. These files contain the details of the planning process and are hereby incorporated by reference into this EIS (36 CFR 219.10(h)). Specific parts of these planning records are referred to throughout the EIS.

Background

The Forest Service's mission includes providing a continuing flow of natural resource goods and services from the National Forests to help meet the needs of the nation and contributing to the needs of the international community. To accomplish this, the agency has adopted several objectives. Those objectives include providing a sustained flow of renewable resources - - outdoor recreation, forage, wood, water, wilderness, wildlife, and fish - - in a combination which best meets the needs of society now and into the future; and to provide a healthy and productive environment for the nation's forests and rangelands.

The management of the Tongass National Forest, like all national forests, is guided by a philosophy of "multiple use". This philosophy, which was given legal status by the Multiple Use Sustained Yield Act of 1960, requires the Forest be managed to provide a sustainable supply of resources, including water, recreation, fish, wildlife, and forest products. The Tongass Land Management Plan provides land allocations, and standards and guidelines to meet this multiple use mission. This land management plan (referred to as the Forest Plan, or TLMP, in this document) and its accompanying Environmental Impact Statement is hereby incorporated by reference.

In order to encourage economic development, including stable employment, in southeast Alaska, the Congress of the United States authorized the Forest Service to enter into long term timber sale contracts. Accordingly, the Forest Service and Alaska Lumber and Pulp Corporation, now Alaska Pulp Corporation (APC), entered into a 50-year contract in 1956. Under the terms of this agreement the Forest Service is obligated to make timber available for harvest by APC on Baranof, Chichagof, Kuiu, and other associated islands.

In November of 1990, President Bush signed the Tongass Timber Reform Act. This Act reaffirmed Congressional intentions to continue the long-term timber sale contracts in Alaska. The Act specified that commercial harvest would not occur within at least 100 feet of anadromous fish streams and provided direction for modification of the long-term contracts to make them similar to independent timber sale contracts. The Act also provided direction about which lands should be designated as wilderness, which lands should be managed primarily for roadless recreation, and which lands would be managed for timber production.

How This Project Relates to the Forest Plan (TLMP)

The North and East Kuiu Project would implement management direction of the current TLMP (completed in 1979, amended in the winter 1985/1986, and again in February, 1991 as a result of the TTRA). Implementation would also be consistent with the recent Supplement to the Draft EIS for the TLMP Revision. The current Forest Plan provides land and resource management direction for the Tongass National Forest. It establishes Land Use Designations (LUDs) to guide management of the land for certain uses. The LUDs are assigned to areas known as Value Comparison Units (VCUs). The boundaries of a VCU usually follow easily recognizable watershed divides. Management Areas (MAs) are formed from one or more contiguous VCUs and allocated to one or more LUDs. Figure 1-2 displays the MAs and VCUs for the North and East Kuiu Project.

This document tiers to the environmental impact statement for both the Alaska Regional Guide (Forest Service, 1983) and the current Tongass Land Management Plan (Forest Service, 1979). In addition, the information from the following documents is hereby incorporated by reference (40 CFR 1520.20):

- 1981-86 and 1986-90 SEIS, November 1989 (Forest Service, 1989)
- 1986-90 Environmental Impact Statement, November 1986 (Forest Service, 1986)
- 1981-86 Environmental Impact Statement, April 1980 (Forest Service, 1980)
- Tongass Land Management Plan Revision: Supplement to the Draft Environmental Impact Statement (Forest Service, 1991)
- Administrative Planning Record Documents (see Chapter 7)

Proposed Action

The Forest Service proposes to make available for harvest by Alaska Pulp Corporation approximately 120 million board feet (MMBF) of sawlog from Management Areas S04 and S09 on Kuiu Island (for vicinity map, see Figure 1-1). In addition to the sawlog volume, utility volume will also be harvested from the same acres. (Utility logs do not meet the quality standards for sawlogs, but apply toward the volume requirements of the long-term contract.) This project includes the construction of forest roads. Work is expected to begin during the 1993 operating season and be substantially completed within three years.

Project Area

The geographic location is the north and east portions of Kuiu Island within the Tongass National Forest in southeast Alaska. The project area includes Tongass Land Management Plan (TLMP) Management Area S04, North Kuiu, and Management Area S09, East Kuiu. The North Kuiu Management Area includes value comparison units (VCUs) 398, 399, 400, 401, 402, and 421. The East Kuiu Management Area includes VCU's 416, 417, 418, 419, and 420. The project area also includes VCU 405.1 which is the non-wilderness portion of Management Area S06, Tebenkof (see Figure 1-2).

Figure 1-1

Project Area Vicinity Map

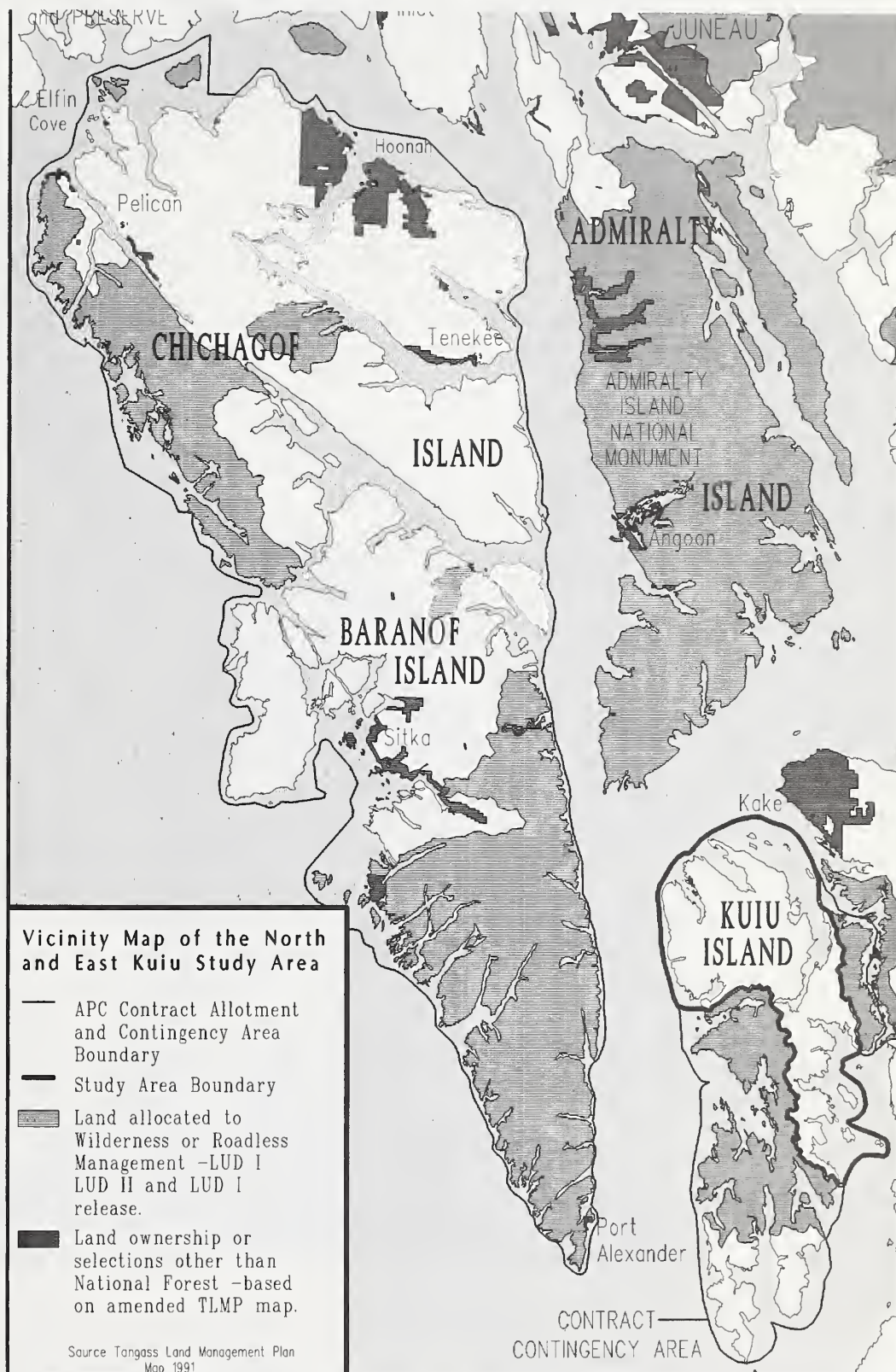
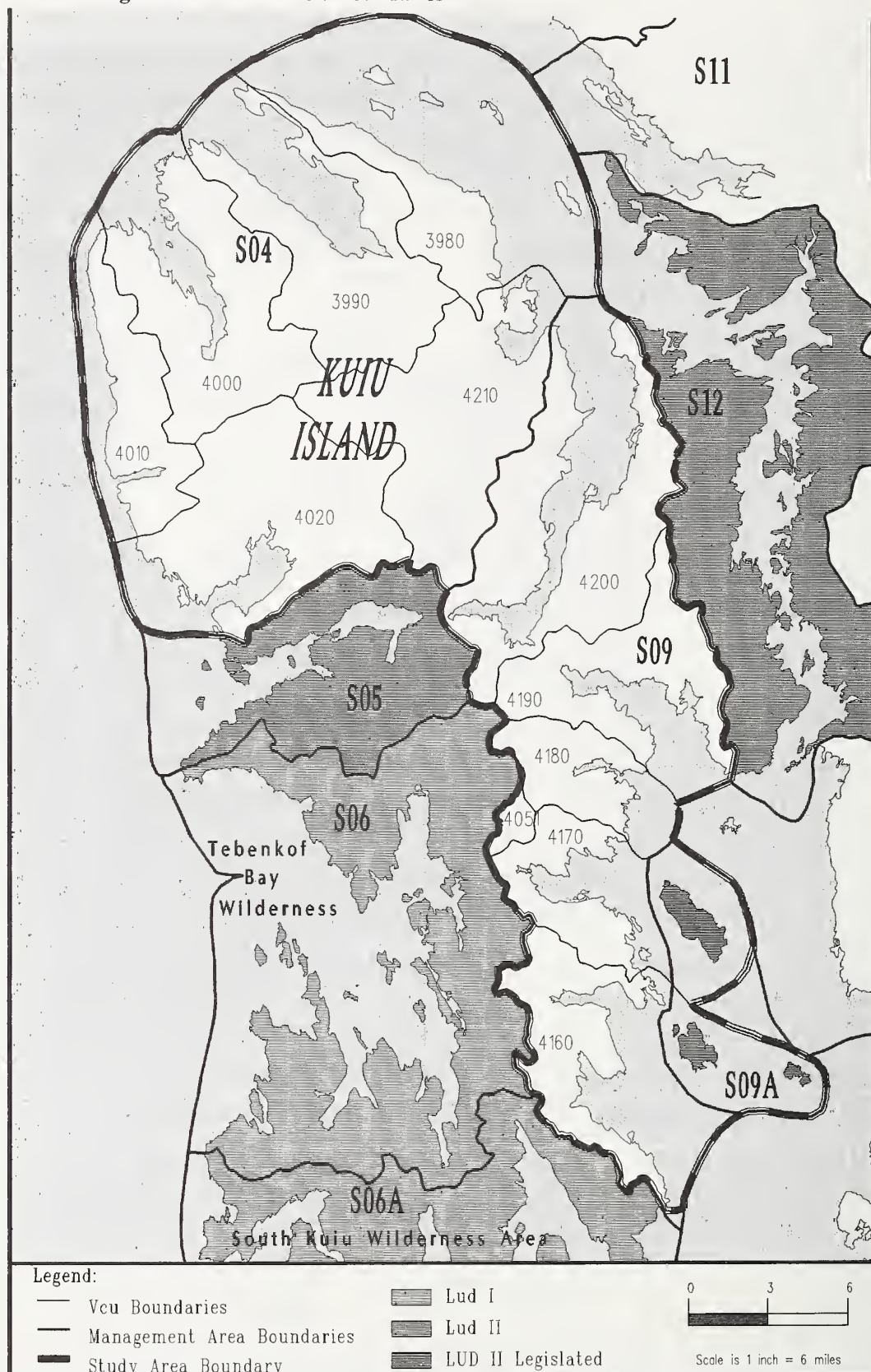


Figure 1-2
Management Area and VCU Boundaries



Purpose and Need

The purpose and need for this project is to implement Forest Plan direction for the project area, meet the federal government obligation to make timber volume available under the APC contract, and to improve the timber productivity of the project area by harvesting mature stands of timber and replacing them with faster growing stands of second growth timber. The timber volume needed for this project is approximately 120 MMBF of net sawlogs. This is enough volume to supply the Rowan Bay camp for three years.

Selection of Project Area

There are several reasons for considering the proposed action in this location. Appendix F provides a detailed rationale for this selection of project area. The reasons for this selection include the following:

As part of the TLMP implementation process and prior to selecting the North and East Kuiu Project Area, all lands within the APC contract area were analyzed and grouped into approximately 18 potential project areas for which timber harvest activities could be proposed and an environmental analysis completed. The potential project areas were identified based on common geographic features, past harvesting activity, pending legislative action, and estimated available volumes of timber.

The North and East Kuiu Project Area is allocated to LUD IV in the Forest Plan and is listed on the current Ten Year Timber Sale Action Plan. LUD IV emphasizes commodity uses such as timber harvest and road construction. The Forest Plan also identified this area as being a major source of forest products for the Alaska Pulp Corporation Long-Term Timber Sale Contract. The Ten Year Timber Sale Action Plan is a schedule for implementing the timber harvest objectives of the Forest Plan and considers timber volume that might be available for harvest as well as logistical considerations such as transportation facilities and adjacent projects.

Current inventories suggest there is sufficient timber volume in the area which can be harvested to help meet the government's obligations under the Alaska Pulp Corporation Long-Term Timber Sale Contract.

Considerable investments have been made in collecting data and designing possible roads and harvest units in this area. Investments have also been made in the logging camp, log transfer facility, community, and administrative site at Rowan Bay which would be the base of operations for timber harvest on Kuiu Island.

Much of the area, primarily on north Kuiu, is already accessible by existing roads. Potential roads have already been located and designed in other parts of the area, primarily east Kuiu.

Management Direction

Management direction for the project area is given in the Forest Plan. All of the VCUs in the project area are allocated to LUD IV except for VCU 405.1 and some islands off the east shore of Kuiu Island which were given LUD II status in the Tongass Timber Reform Act (TTRA). According to the Forest Plan, LUD IV lands are to be managed for intensive development of resources with the primary emphasis on commodity or market resources. Amenity values are also provided for, and when conflicts over competing resource uses arise, they would most often be resolved in favor of commodity values.

Timber will be harvested primarily by clearcutting. Potential timber yields will be reduced only to the extent necessary to protect key biological and aesthetic values.

Under the APC contract and the Forest Plan, the North Kuiu Management Area is part of the designated contingency sale area for the Alaska Pulp Company. Under the Forest Plan, this management area is available to support a substantial portion of APC's wood products requirements. Both normal and modified timber management practices will be required to achieve full productivity of the land base. (Modified timber management includes long rotations and uneven-aged techniques that tend to reduce timber yields in the interest of other resource objectives.) There will be an opportunity over extensive areas for management of second growth timber stands. Minerals, sport and commercial fisheries, and commercial recreation opportunities will receive increasing management emphasis over the long term as use increases. The transportation system management objective is to have an interconnected road system on the island where it is economically and environmentally feasible. Rowan Bay will be a major work center for management, development and use of resources over a major portion of Kuiu Island for the foreseeable future.

Under TLMP direction and the contract, this management area is one of the principal land bases for timber production for the APC long-term contract. Most of the area will probably be accessible by road from Rowan Bay. In the future, one or more log transfer facilities will likely be developed for overall efficiency of the sale. Emphasis on management of young, even-aged timber stands will increase.

The proportion of higher volume stands (volume class strata 6 and 7) harvested under the APC contract will not exceed the proportion of those stands existing within each management area as of November, 1990 (TTRA).

Current Management

The existing resource situation within the project area is described in detail in Chapter 3. A brief discussion of current management is included here. A discussion of the desired future condition is also included.

The project area encompasses approximately 214,000 acres of land. Approximately 73,500 acres, or 34 percent of the project area, were identified by the Forest Plan as forest land scheduled for timber harvest over a 100-year time span. VCUs 416, 417, and 418 were recently considered for possible wilderness designation, however, the Tongass Timber Reform Act designated Sumner, Conclusion and Strait Islands as LUD II (Roadless Areas) and left the remaining areas of these three VCUs as LUD IV.

Since the 1960's, approximately 23,000 acres of the 73,500 acres scheduled for timber harvest in the area by the Forest Plan have been harvested or are expected to be harvested by 1993. The majority of the harvested acres are in the North Kuiu Management Area (MA S04). In the East Kuiu Management Area (MA S09), timber has been harvested within the last few years in VCU 419 and the west side of VCU 420. The other timber harvest in the East Kuiu Management Area was mostly logging from the beaches that occurred in the 1950's and 1960's. Within the project area, 68 percent of the acres scheduled for harvest by the Forest Plan have not been harvested.

Rowan Bay serves as a major work center for management of Kuiu Island. Much of the North Kuiu Management Area is accessible by road. The only active log transfer facility on the island is at Rowan Bay. Except for Threemile Arm and the west side of Port Camden, there is no road access in the East Kuiu Management Area. Significant opportunity exists throughout the project area to improve timber productivity and contribute to meeting contractual obligations with APC by harvesting mature stands that have little or no growth, and replacing them with younger, faster-growing stands of timber.

Desired Future Condition

The desired future conditions of the environment, economic factors, and social needs associated with Management Areas S04 and S09 provide the foundation to develop and compare alternatives to achieve the objectives of this proposal. The three action alternatives which will accomplish the purpose and meet the need of this proposal were developed to achieve the following desired future conditions:

Desired Future Environmental Condition

Biological Diversity

The landscapes on Kuiu Island will include timber stands at various successional stages. Overall, they will have plant and animal species diversity similar to that found in unaltered landscapes. Viable populations of all species will be maintained.

Site Productivity

Soils will be managed under principles of multiple use and sustained yield to maintain or improve land and soil productivity.

Water Quality

The chemical, physical, and biological quality of water resources will be maintained. The implementation of Best Management Practices (BMP's) will meet the intent of the Clean Water Act and State water quality standards.

Managed Forest Stands

Harvested stands will be intensively managed to maintain vigorous growth with a minimum of disease and insect problems. Problems including stem and root rot, hemlock fluting, dwarf mistletoe, and wind damage will have minimal influence upon stand health and growth. All stands that are harvested will have a young, vigorous stand of trees established within 5 years after harvest. Species composition in these stands will include species normally found on similar sites or those which meet the stand management objectives.

Desired Future Economic Conditions**Community Prosperity and Vitality**

Resource use will contribute to employment opportunities and a stable economic base for southeast Alaskan communities.

Contractual Obligations of the Federal Government

Provisions of the Alaska Pulp Company long term timber sale contract will be completed. One of the main objectives of the contract will have been attained: a permanent, stable wood products industry will have been established in southeast Alaska.

Natural Resource Supplies

A balance between resource preservation and use will be achieved. Publicly agreed upon amounts and qualities of forest products, recreational opportunities, fish, game, and other renewable resources will be provided at sustainable levels.

Transportation Systems

The majority of the operable commercial forest land allocated to timber harvest, from Saginaw Bay to Reid Bay, will be accessed by an interconnected road system. Management of the land will be easier, and timber harvest costs will be reduced by the completion of the forest development transportation system.

Fish Habitat Capability

Management practices, such as providing streamside buffer strips and fish passage at all anadromous stream road crossing sites, and habitat improvement projects, such as constructing fish ladders, will protect or enhance fish habitat. This will result in higher habitat capability for species with present or anticipated future demand.

Resource Availability

Stands will be available for future harvest with species and volume supplies adequate to support intensive management costs and industrial opportunities in future years. Forest product

resources will be available in part due to more fully utilizing site productivity which will result in increased stand yields.

Desired Future Social Conditions

Public Laws and Regulations

NFMA, TTRA, and other laws will be interpreted and appropriate policy will be developed to implement the intent of the laws so public resources are properly used and protected.

Partnership Development

Individuals and organizations will participate in the planning, funding, and implementation of resource management activities.

Landscapes on Kuiu Island

Visual perceptions of the land and associated activities will be acceptable. Management activities will be understood in the proper context of the many social values and environmental conditions.

Recreation Opportunities

Existing improvements and activities will be maintained, and development of additional opportunities will occur to promote use of all resources.

Archeological Sites

The known and reported archaeological sites will be protected from damage, and an understanding and appreciation of past cultures will be further developed.

Limited Use Areas

Designated wilderness and other areas with restricted use designations will not be adversely affected by management activities, and will be modified by natural processes only.

Decision to be Made

The decision to be made is whether to make timber available for harvest to meet contractual obligations to APC and improve timber productivity in the North and East Kuiu Project area while also providing a combination of recreation, fish, water, and wildlife for the needs of society now and into the future. If timber is made available for harvest, Abigail R. Kimbell, Forest Supervisor, Tongass National Forest, Stikine Area, will decide (a) whether to proceed with the project and how much volume to make available; (b) the location and design of the timber harvest units and necessary log transfer facilities; (c) the location and design of associated mainline and local road corridors; and (d) mitigation measures and enhancement opportunities for all resources in the project area.

Public Review and Comment

The public involvement for this project began formally with the publishing in the Federal Register on June 15, 1990, of a Notice of Intent to Prepare an Environmental Impact Statement. The Notice of Intent described eight tentative issues that were identified by the interdisciplinary team after reviewing previous public input for Kuiu Island.

These same tentative issues were described in a brochure that was mailed to 453 individuals and organizations on the Stikine Area mailing list. Twenty-two of those responded. From those responses, all eight tentative issues were validated and three new issues were added.

Public comments received during the planning process were added to the planning record and addressed in the analysis (see Appendix G). Subsistence hearings were held and copies of the transcripts are in Appendix K.

Scope of the Analysis

Eleven issues have been identified through the scoping process. These issues establish the extent and depth of analysis need for this EIS. They also provide a basis for the formulation of alternatives. Each alternative considered in the EIS addresses the issues differently. The issues identified for the North and East Kuiu Project follow:

1. CULTURAL RESOURCES - How should timber management activities be designed to protect cultural resources?

A "high probability zone" where cultural resources are likely to be found has been identified based on cultural resource surveys. Results of field surveys within this high probability zone will be used to assess the potential impacts to cultural resources.

2. ECONOMICS - How should the project be designed to contribute to the economic health of southeast Alaska?

Income and employment impacts to the economy and the relative economic efficiency of the alternatives will be used to assess how the alternatives respond to this issue. Another aspect of this issue is costs to the public for making this timber available for harvest. Estimated costs and returns to the government will be compared to address this aspect of the economic issue.

3. FISH - How would fish habitat be managed and what effects would timber harvest and related activities have on fish habitat?

Indicators of responsiveness to this issue are the miles of Class I and II stream buffers and the number of road crossings on Class I and II streams.

4. MARINE ENVIRONMENT - If Log Transfer Facilities are considered, how should they be designed and located to minimize the effects on the marine environment?

Effects upon marine habitat and uses such as anchorages will be the primary indicators of responsiveness to this issue.

5. RECREATION -How should recreation opportunities be protected or enhanced in the design of timber management activities?

Recreation will be assessed in both qualitative and quantitative terms. The quantitative assessment will focus on changes in ROS class and the number of recreation places affected. The qualitative portion of the assessment will be more subjective and will focus on attributes, suitability, and uniqueness of the area.

6. SOIL - How should timber management activities be designed to protect the soil resource? What effects would activities have on soil productivity?

The main soil concern is the potential for landslides and soil displacement. Acres of harvest by soil hazard class will be used as an indicator of responsiveness to this issue.

7. SUBSISTENCE - How should timber management activities be designed to protect traditional subsistence uses? What effect would activities have on subsistence uses?

Salmon, deer, and otter will be the focus of the subsistence evaluation. Waterfowl, black bear, shellfish, and other foods will also be considered but are less likely to be affected. The subsistence evaluation will also consider access and competition for subsistence resources as indicators of how the issue will be addressed.

8. TIMBER MANAGEMENT - How should the project be designed to provide for efficient and productive long-term timber management?

Miles of road construction and acres of regenerated timber stands will all be considered in assessing how the alternatives respond to this issue.

9. VISUAL RESOURCE - How should timber management activities be designed to protect areas of high scenic quality and what effect would activities have on the landscapes of Kuiu Island?

The visual resource will be assessed in both qualitative and quantitative terms. The quantitative assessment will focus on changes in acres of existing visual condition (EVC) by alternative.

10. WATER QUALITY - How should timber management activities be designed to protect the water quality? What effects would activities have on water quality?

The water quality issue is related to changes in stream temperature and sedimentation. Stream temperature is addressed narratively. Watershed condition analysis responds to the sedimentation issue. Timber harvest acreage, harvest on high hazard soils, stream mileage within and bordering clearcuts, road mileage, and stream crossing numbers are also responsive to this issue.

11. WILDLIFE HABITAT - What effects would timber harvest and related activities have on wildlife habitat?

Management indicator species have been identified to reflect the wide variety of wildlife species indigenous to southeast Alaska. The amount of habitat affected, and estimated project impacts on populations of these indicator species will be used to indicate responsiveness to the wildlife habitat issue. The indicator species are Sitka black-tailed deer, black bear, pine marten, river otter, and bald eagle. The types of habitat that will be analyzed are beach fringe, estuarine fringe, riparian, and forested habitat. Old growth blocks will also be discussed.

Issues Outside the Scope of this Analysis

The scope of this analysis is limited to addressing the proposed action and alternatives to that proposed action. This analysis does not address management of the Tongass National Forest outside of the project area, nor the land allocations or management direction within the project area. The Tongass Land Management Plan, currently being revised, is dealing with these issues. This analysis focuses on whether or not, and how, to implement a specific project proposal in a specific area, given existing Congressional direction and existing Forest Plan direction.

The following issues were raised during the scoping process but are beyond the scope of this analysis or beyond the boundaries of the study area:

1. Should south and east Kuiu be classified as something other than LUD III and IV?

The allocation of management areas to particular management prescriptions (in this case LUDs) is a question the Forest Land Management Plan addresses. The Forest Plan establishes overall resource management goals and objectives and appropriate management direction to meet those goals and objectives.

2. Can the Tongass National Forest provide a steady and reliable supply of logs to the pulp and sawmills?

The decision to determine an overall allowable sale quantity for the Tongass National Forest is addressed in the forest land management plan process which establishes forest-wide resource objectives. It is currently being re-assessed as part of the revision of the Tongass Land Management Plan.

3. Should development be permitted in the Bay of Pillars and Alecks Lake areas?

Both of these areas are outside of the study area and are therefore not being considered as part of this project. Alecks Lake is in a Congressionally designated Wilderness Area where

development is not permitted. Bay of Pillars is in a designated LUD II area (in the 1985-86 TLMP Update) where no timber harvest is allowed and other development is very limited.

4. What is the relative economic value of managing and using high volume, low elevation forest habitat for timber vs. non-timber uses?

The tradeoffs involved in timber vs. non-timber uses is a complex question best addressed on a forest wide basis where the supply and demand for various resources throughout the forest can be considered collectively. The Forest Plan establishes resource objectives and land allocations. The Forest Plan has allocated the management areas being considered in this project to LUD IV which has an objective of providing for the development of market resources. As for the extent of high volume stands committed to timber development, Congress has addressed this question as part of the Tongass Timber Reform Act (TTRA) which requires that the percentage of high volumes stands harvested over a rotation may not exceed the percentage of such stands existing in a management area when the TTRA was passed. (The timber section in Chapter 3 provides more information on the TTRA proportionality requirements.)

5. Should commercial timber harvest be permitted in existing stream buffers?

The TTRA does not permit commercial timber harvest within the 100-foot stream buffers along salmon streams and resident fish streams that are directly tributary to salmon streams, except where it is necessary for the protection of the riparian resources. Since this has been established by recent law, there is no need to address it further in this analysis.

6. Should a disproportionate percentage of high volume stands be harvested?

The TTRA has established (for the long-term timber sale contracts) that the harvest of high volume stands will be limited to the percentage that those stands represent as of the date the legislation was passed. Since this question has been answered by recent legislation, there is no reason for it to be part of this analysis.

7. Can the present rate of harvest on Kuiu Island be sustained?

The National Forest Management Act (NFMA) directs that a sustainable level of harvest be identified for each National Forest. A sustainable level of harvest is one in which the level of harvest is equal to or less than the rate of growth over a period of time (ten years in the case of NFMA). There is no direction or intent to establish a sustainable level of harvest for any geographic subdivision of the Forest. (This issue was raised in relation to the effects on wildlife. The amount, location, and condition of wildlife habitat in the study area is addressed as a separate issue.)

No Action Alternative

A "no-action" alternative has been analyzed. This alternative provides a benchmark to compare other action alternatives. The no-action alternative does not address termination of the long-term contract with APC. It would be possible to select the no-action alternative and still meet the obligations under the long-term contract by making timber available in other

locations, although it is likely additional harvest in the Kuiu Management Area would occur prior to termination of the contract in 2011 in order to meet contract volume requirements.

Approvals Required From Other Agencies

The Forest Service is responsible for obtaining permits from other agencies before proceeding with timber harvest and associated activities. Administrative actions regarding these permits would not take place until after the 30-day waiting period following the filing of the Final EIS with the Environmental Protection Agency. Required permits and licenses and the issuing agencies may include the following:

U.S. Army Corp of Engineers:

Approval of dredge or fill materials into the waters of the United States under Section 404 of the Clean Water Act.

Approval of the construction of structures or work in navigable waters of the United States under Section 10 of the Rivers and Harbors Act of 1899.

Environmental Protection Agency:

National Pollution Discharge Elimination System Review (Section 402 of the Clean Water Act).

State of Alaska, Department of Natural Resources:

Tideland Permit and lease or easement.

State of Alaska, Department of Environmental Conservation:

Solid Waste Disposal Permit.

Certificate of compliance with Alaska Water Quality Standards (Section 401 of the Clean Water Act).

United States Coast Guard:

Coast Guard Bridge Permit (in accordance with the General Bridge Act of 1946) required for all structures constructed over navigable waters.

U.S. Fish and Wildlife Service:

Compliance with the Endangered Species Act.

National Marine Fisheries Service:

Compliance with the Endangered Species Act.

Major Legislation Relating to the EIS:

National Environmental Policy Act of 1969 (as amended)

Forest and Rangeland Renewable Resources Planning Act of 1974

National Forest Management Act of 1976

Clean Water Act of 1977

Tongass Timber Reform Act (1990)

Multiple-Use Sustained Yield Act (1960)

Alaska National Interest Lands Conservation Act (ANILCA) (1980)

National Historic Preservation Act (1966)

Archaeological Resources Protection Act (1979)

American Indian Religious Freedom Act (1978)

Bald Eagle Protection Act, 16 USCS 668 (1940, as amended)

Coastal Zone Management Act of 1976 (CZMA):

The Alaska Coastal Management Program (ACMP) developed under CZMA contains the standards and criteria for a determination of consistency to be made by the Forest Service for activities within the coastal zone. Although Federal lands are excluded from the Coastal Zone, the Coastal Zone Management Act of 1976, as amended, requires Federal agencies conducting activities or undertaking development affecting the coastal zone to ensure that the activities or developments are consistent with approved State management programs to the maximum extent practicable. The applicable standards for timber harvest are embodied in the Alaska Forest Practices Act.

Chapter 2

Alternatives

Alternatives

Introduction

This chapter documents the alternative development process and comparison of alternatives. Included are:

Alternative Development Process - This section gives some background information and describes how the alternatives were designed.

Alternatives Considered But Eliminated From Detailed Study - This section describes alternatives that were considered, but eliminated from detailed study, and the reasons for eliminating them.

Alternatives Considered in Detail - This section summarizes direction common to all alternatives; and describes and compares each of the alternatives including the No Action Alternative.

Alternative Development Process

An alternative is a set of activities designed to accomplish the goal described in the *Purpose and Need* section of Chapter 1. The alternatives are designed around themes that provide different approaches to responding to issues. The National Environmental Policy Act (NEPA) regulations (40 CFR 1502) mandate detailed consideration of reasonable alternatives to a proposed action, and identification and brief discussion of alternatives eliminated from detailed study.

The following is a brief description of the steps followed in the development of alternatives. The process generally followed the sequence presented below, however many of the steps were iterative in nature and most of the steps were repeated several times throughout the process.

1. ISSUES - Major issues were identified through public involvement efforts. An interdisciplinary planning team (IDT) was assembled to identify possible alternatives and conduct an analysis of the alternatives. The members of the IDT were selected to assure the proper mix of skills to address all of the significant issues and resources. For each major issue, a set of strategies that could be used to resolve that issue was developed by the planning team. The team also identified indicators of responsiveness for each of the issues. These indicators provide a means of measuring or comparing how each alternative responds to the issue.

2. UNIT POOL - Some past timber sale planning efforts, especially larger ones, have proposed activities that have later proven difficult to implement because of unforeseen resource conflicts or topographic logging problems. This has resulted primarily from the need to focus the NEPA analysis on the entire project area while at the same time providing site specificity. Examination of the larger area is generally done from extensive resource inventories that are based primarily on aerial photo examination. The site specific detail aspect of the project planning requires a more intimate knowledge of the resources of the study area.

The North and East Kuiu project has used the "Unit Pool" concept to insure that the majority of the units proposed in the alternatives are feasible based on actual on-the-ground reconnaissance to verify both inventory resource interpretations and potential logging and transportation systems design.

A large pool of units that have been verified on the ground was designed from which the alternatives were developed, based on their respective themes. This kept the total number of units to be verified on the ground within a manageable range while giving the flexibility needed to develop a range of alternatives that could explore a variety of approaches to addressing the issues.

The process for designing the pool of units was the same as described in the Regional Guide and the Tongass Land Management Plan as Amended in the winter of 1985-86:

First, unregulated areas where timber harvest is not considered prudent because of unstable soils or v-notches are identified. These sites are avoided in the unit design process.

Second, resource inventories are gathered and examined to identify areas where special design considerations may be necessary.

Within this basis, the design process considered the following additional factors:

Topography - Dispersion of created openings must consider topography and how it relates to the capabilities of the harvest equipment, how it relates to the windthrow risk of the residual stand, how it relates to wildlife habitat and visual quality considerations, and how it relates to future entries to adjacent stands.

Relationship to other openings - Consideration must be given to the long-range strategy of wildlife habitat and visual quality while insuring that residual uncut stands will constitute logical future logging units.

Soil and Water - Best Management Practices are incorporated to protect sensitive soils and riparian stream habitats.

The planning team developed a "pool" of potential harvest units and the roads needed to access those units. This unit pool consisted of 188 harvest areas that would meet TLMP standards for visual quality and wildlife needs while protecting soil and water resources. Three sources of information were key to this development. First, extensive field work was performed to layout roads and units on east Kuiu as part of the EIS for the 1986-1990 Operating Period for the APC Long-Term Sale Area. Second, the planning team did extensive field reconnaissance of potential harvest unit and road locations. The third source of information was the computer based resource inventory. Using this inventory, the team produced maps that displayed all of the areas where timber harvest would not be considered due to stream buffers, over-steepened soils, eagle nests, and other resource concerns. From this information, the alternatives could be developed based upon their respective themes.

With all of this information available, the team proceeded to design specific units. One of the key factors involved in the unit design was the need to design unit boundaries to be as windfirm as possible. This step involved at least as much art as it did science. First the team considered the general location of the prospective unit: Where is it located on the slope? Are there streams, especially fish streams, nearby? Which wind direction results in the most blowdown in that vicinity? Is the unit protected from the wind by nearby topographic features? After considering these variables the team would shape the unit in a manner that would minimize, as much as practicable, the amount of boundary that would be exposed to and somewhat perpendicular to the strongest winds.

While windthrow was one of the primary concerns, there were other concerns addressed during the unit design. Units were shaped and located in a manner that would protect the most valuable wildlife habitat in an area and also allow for travel corridors between key habitat areas. Units that would be visible from saltwater were sized and shaped to blend with the surrounding landscape. Units had to be located where roads could be built efficiently and with minimum resource conflicts. The economics and physical capability of available logging systems was considered in the design of each unit. Best Management Practices were incorporated to minimize impacts to streams and fish habitat. Soils were protected by locating units away from extreme hazard soils and requiring yarding methods that would protect sensitive soils.

Many of these resource considerations and the design features used to address them are documented on the unit plans in Appendix A.

3. ALTERNATIVE THEMES - Themes were developed for the "action" alternatives. The team matched one or more appropriate issue resolution strategies with each alternative based on the theme of that alternative. This provided a basis for matching potential harvest units with the alternatives. The individual units from the unit pool could then be refined to better match the alternative theme. The elements in these themes were used to guide the development of the alternatives, but they are not absolute standards and can be violated. Although the team stayed within these themes as much as possible, sometimes it was necessary to make exceptions. Any elements of an alternative that are not within the theme are noted in

the effects analysis in Chapter 3. The action alternatives were designed to respond both to the alternative themes and the purpose and need for the project which includes a timber volume of approximately 120 MMBF of net sawlog.

4. ALTERNATIVE REVIEW - The three action alternatives and the one no action alternative were then reviewed by the Stikine Area Forest Management Team and members of the public who had indicated during the scoping process that they wished to be involved throughout the planning process. Alternatives were refined based on input from these reviews.

5. ALTERNATIVE EVALUATION - The planning team then evaluated and compared the alternatives in terms of how they responded to the issues and purpose and need. Based on this evaluation and comparison, the Regional Forester identified one as the preferred alternative.

6. NEW PERSPECTIVES AND ECOSYSTEM MANAGEMENT - Development of the alternatives was strongly influenced by the forest management concepts embodied in New Perspectives and the Ecosystem Management Strategies that were embodied in a letter from the Chief of the Forest Service dated June 4, 1992. New Perspectives is the Forest Service initiative to implement the new direction in the 1990 RPA Recommended Program. This direction calls for research and management of national forests for their full array of social values and benefits, with increased emphasis on fisheries, wildlife, recreation, ecological sustainability, and long-term productivity.

The New Perspectives program has two main objectives. First, to demonstrate the new directions for socially responsive and scientifically sound management of lands and resources to meet people's needs for forest products while protecting natural and cultural resources, for the long-term health of the land and quality of life. Second is to develop the new scientific knowledge and technologies needed to better manage forest ecosystems. We are seeking management practices that sustain a high degree of ecological structure function, and diversity of life while producing sustainable yields of natural resource products.

New Perspectives and ecosystems management looks at forest management on two levels; (1) the landscape level, which considers the dynamic nature of forest succession on a broad geographic scale such as a VCU or watershed; and (2) the stand level, where the focus is on the ecology of an individual harvest unit of forest stand. At both levels, management practices need to utilize the concepts of ecosystem complexity, biological legacies, viable landscapes to retain ecological values, and resilience to environmental stresses.

In the development of alternatives, caution has been taken to avoid the widespread application of practices that are untested and/or lack a scientific basis. In this regard, two areas within the study area have been specifically identified to develop and test New Perspectives ideas. These are: (1) Saginaw Bay - Cool Lake area (Unit 399-19 in Alternatives 2 and 4); and (2) Alvin Bay research area (Units 416-6, 7, & 8 in Alternatives 3 and 4).

Unit 399-19 in the Saginaw Bay - Cool Lake vicinity is designed as an area of small group selections and/or very small clearcuts in an attempt to mimic the existing pattern of small even-aged stands of blowdown origin. (Small group selection is considered to be an uneven-aged silvicultural technique with openings of up to two acres. Openings of two to five acres in size would be considered small clearcuts.) This unit is designed to test the feasibility of the management practice to maintain the heterogeneous pattern of horizontal structural diversity and maintain visual and wildlife values. Further details regarding the Cool Lake unit can be found in Appendix A.

Units 416-6, 7, and 8 in the Alvin Bay area are designed specifically to test silvicultural alternatives to clearcutting. Units 416-6 and 8 are clearcut harvest units using skyline cable yarding systems. Unit 416-7, located on the same hillslope between units 6 and 8, is designed for a variety of partial-cut harvest methods. This joint research/demonstration project was initiated in 1979 as a cooperative effort between Alaska Pulp Corporation and the Forest Service. Considerable baseline data on streamflows has been gathered in this watershed so that comparisons can be made between streamflows before harvest and after different types of harvest. The project was not completed. Logging did not occur in the Alvin Bay area because Alvin Bay was included in one of the "moratorium areas" established as a result of Congressional consideration of possible additions to the national wilderness system. The area was released from wilderness consideration with the passage of the Tongass Timber Reform Act. See Appendix I for the revised study plan for the project proposed in Alvin Bay and Appendix A for the individual unit plans for the associated units.

7. PUBLIC INPUT - The alternatives were refined in response to public comments on the DEIS and additional field verification. The Draft EIS for this project was released in April, 1992. The intent of releasing a draft EIS is to allow the public to comment on the alternatives so that the agency can respond to the comments and consider the public input in making a final decision on the proposed action.

A total of fifty-one responses to the draft EIS were received. Several more people expressed their opinions about the project during a series of six subsistence hearings. The public hearings were held in four communities in the vicinity of the project to give the public an opportunity to express their views on how the project would impact their subsistence activities. Input received during the hearings covered a range of topics including, but not limited to subsistence.

All of this public input is considered in the final decision for this project. (See the Record of Decision.) In response to public comments, some sections of the EIS have been expanded, and corrections have been made in other sections. Specific responses are documented in Appendix G. Another very important result of the public input is a number of changes that have been made to the alternatives. The following table lists specific components of the alternatives that have been modified as a result of public input.

Changes To North And East Kuiu Units Between Draft And Final

Resource Issues:

F = Fish\Hydrology L = Logging Systems B = Beach Fringe V = Visual
 W = Wildlife E = Estuarine Buffer T = Transportation S = Soils

Unit#	Reason	Comments
399-17	F	Class II streams were found in the unit. The north setting was dropped.
400-08	F/V/W	A Class II was found in the unit. 23 acres were deleted for a stream buffer, wildlife corridor and visual concerns. It was split into two units, 400-21 was added.
400-17	S	Dropped due to steep slopes and high hazard soils present in the unit.
400-21	F/V/W	New unit split off 400-8, designed to minimize the visual impacts from Security Bay and meet the VQO.
402-16	F	A Class II was found along the eastern boundary and buffered. The unit was redesigned with 402-18.
402-17	F	A Class II was found and the unit split into two units to provide a windfirm buffer on the Class II. Unit 402-48 was created. It was redesigned along with 402-18.
402-18	F	Unit was redesigned along with 402-16 and 402-17.
402-20	F	Eliminated buffer, Class III stream was verified.
402-21	F/T	Relocated spur to avoid Class II stream.
402-24	F	Streams in or near unit were verified and the unit was modified to accommodate them. About 15 acres were deleted.
402-28	E	Dropped cable setting for estuary buffer.
402-29	S/L/V	Enlarged helicopter offering while maintaining the original design intent to work with natural features found in the landscape (slide paths). Unit was moved further up slope to minimize risk of blowdown.
402-30	T/L	Combined with 402-33 to facilitate efficient long term use of resources.
402-33	T/L	Combined with 402-30 to facilitate efficient long term use of resources.
402-35	B	Unit was modified to accommodate a 500-foot beach fringe.
402-36	F	Dropped south side of unit due to Class II stream.
402-41	F	Class I stream (coho rearing) found in SW corner of unit-braided. The SW corner was deleted.
402-44	F	DROPPED. Class II streams were found and it was decided that a buffer would not be windfirm.
402-45	F/L	Class I and II streams were found. Dropped the portion below the road. Some was added to the south end to pick up blowdown.
402-46	F	A Class II was found and the unit was split into 2 units to make a windfirm buffer.
402-47	F	NEW. Modified from 402-46 due to Class II buffer.
402-48	F	NEW. Remnant of 402-17,18. Created new small unit.

Unit#	Reason	Comments
402-49		NEW. New unit near sandy beach.
416-01	F	A Class II stream was found in the unit and buffered.
416-07	F	Deleted a small portion of the unit because the Class I needed a 100-foot buffer.
416-09	LUD	Unit changed to accommodate the Wilderness boundary.
416-11	F	Delete some of unit, to protect a Class II stream.
416-17	V	DROPPED to meet the theme of Alt. 3 (meet VQOs).
416-22	F	Northern boundary changed to maintain estuarine habitat and provide wind protection for the Class I.
416-23	V	DROPPED to meet the theme of Alt. 3 (meet VQOs).
416-24	V	DROPPED to meet the theme of Alt. 3 (meet VQOs).
416-25	V	DROPPED to meet the theme of Alt. 3 (meet VQOs).
416-26	V	DROPPED to meet the theme of Alt. 3 (meet VQOs).
416-29	V	DROPPED to meet the theme of Alt. 3 (meet VQOs).
416-30	V	Redesigned eastern boundary to be undulating, working with topographic features. Small patch of standing timber retained to provide visual diversity on this hillside. Both measures intended to reduce long term visual impact and meet the VQO.
416-32	V	DROPPED to meet the theme of Alt. 3 (meet VQO's).
417-01	V	Changed northern boundary (backline) to minimize visual impacts, and meet the modification VQO as seen in the middleground distance.
417-03	V/S	Lowered western boundary which was visible from No Name Bay. Southern settings oversteepened 100% slope.
417-06	B	Added beach fringe protection.
417-09	V/W	DROPPED to minimize impacts to visual and wildlife resources.
417-11	L	Deleted western setting boundary because full suspension over Class III stream can be achieved.
417-12		DROPPED volume north of road to ensure maintaining windfirm buffer on Class II stream.
417-13	V	Reshaped backline using natural notches to define the edge, reducing overall visual impact of unit as seen from No Name Bay.
417-14	F	DELETED northern settings to buffer Class II stream, areas north of buffer were added to Unit 417-22.
417-15	F	ADDED Class II stream buffer in western setting, split the unit.
417-18	E	Acreage deleted from the north end for an estuarine buffer.
417-20	F	Deleted acres to protect Class II stream.
417-22	T	ADDED settings from 417-14, which were to the north of the Class II stream buffer.
417-23	F	DROPPED. Class II stream buffer made the unit too small.
418-01	F/W	Buffered Class I stream and added a wildlife buffer on the lake.

Unit#	Reason	Comments
418-02	V	DROPPED upper half of unit to minimize negative visual impacts as seen from Salt Lagoon and Seclusion Harbor. Unit redesigned to minimize apparent size and to meet the VQO.
418-03	L/F	Southern setting was combined with 418-4. DROPPED northern settings due to a side channel in the upper end.
418-04	L/V	See comment for unit 418-3 above.
418-06	F/L	DELETED northern portion of all settings to provide buffer for Class I and II streams.
418-10	L	ADDED a small section to the southwest end of the unit, to maintain a windfirm edge.
418-13	V	DELETED a small wedge on the eastern boundary (lower edge of unit) to create an undulating, more natural appearing line.
418-17	T	ADDED to unit pool to facilitate long term, efficient use of resources.
419-3	F	DROPPED setting to provide buffer of Class II stream east of the unit.
419-27	F	Class II stream split the unit. Eastern portion was deleted.
419-29	F/V	DROPPED southwest setting and redesigned unit. Moved it away from the slide on the Class II stream.
419-30	LUD	Deleted two NE settings due to the LUD II boundary.
419-31		DROPPED. Acres added to 420-25.
420-15	V	Dropped from Alt. 3 to be consistent with the theme of the alternative.
420-17	V	Dropped from Alt. 3 to be consistent with the theme of the alternative.
420-19	T	Added a spur to access the southernmost setting.
420-21	L	Added a split line over the Class III stream.
420-23	V	Broke into 2 units to minimize visual impacts as seen from Port Camden. Unit 420-49 was created.
420-25	F	DROPPED the north setting for Class II stream protection. Add to south boundary to make it windfirm. Combined with 419-31 and drop remaining settings of 419-31.
420-28	F/L	Buffer put on wrong splitline, changed split to correctly buffer the Class II stream.
420-32	V/L	DROPPED out the center setting. Add a landing and spur.
420-33	F	Eliminated a portion of the SW boundary to make the Class I stream buffer windfirm.
420-37	F	DROPPED the small area on north end where partial suspension was planned over the Class III stream.
420-39	B/F/V	DROPPED the north setting for beach fringe, Class III stream and visual concerns.
420-42	F	Took a little off the west boundary to make a windfirm buffer on the Class II stream.
420-45	F	Added Class III in unit. No change to unit. Northern boundary extended toward 421-39.

Unit#	Reason	Comments
420-46	V/S	Redesigned and reshaped due to visual concerns and avoided highly fractured volcaniclastic rock.
420-47	V/S	Visible from Port Camden, redesign-teardrop shaped. Avoided highly fractured volcaniclastic rock.
420-49	V	Broke up 420-23 due to visual concerns and created 420-49.
421-38	F	Deleted 2.5 acres to protect a Class II stream.
421-39	W	DROPPED. Goose nest along western boundary, maintain habitat. Eastern setting added to 420-45.
421-41	F	Several Class II streams were found, acreage deleted from each end to protect these streams.
	W	Deleted northernmost setting for wildlife corridor.
421-46	F	Class II streams were found and the unit was modified to protect them.
421-47	F	DROPPED, too close to Wild-Scenic river, southern fork of Kadake Creek. A Class I stream was found and a buffer was added along the southern boundary.

Alternatives Considered But Eliminated From Detailed Study

Initially, three alternatives (in addition to the "no-action alternative") were developed to respond to the issues. This first set of alternatives represented a broad range of responses to the issues, but did not meet the proportionality requirements of the recently passed Tongass Timber Reform Act. Each of these alternatives is discussed briefly. More specific information on harvest units and volumes, including maps of the alternatives is available in the planning records in the Stikine Area Supervisor's Office in Petersburg, Alaska.

Alternative 2.1 - This alternative would have produced about 113 million board feet (MMBF) from 5,681 acres. Harvest would have been concentrated on North Kuiu leaving East Kuiu essentially un-roaded. About 87 additional miles of road would have been constructed. This alternative provided the basis for Alternative 2. The theme is the same as Alternative 2, but it was necessary to change the mix of units from the unit pool in order to satisfy the proportionality requirement.

Alternative 3.1 - The focus of this alternative was maximizing investments in the road system on East Kuiu to facilitate future resource development and at the same time reducing impacts on North Kuiu by deferring additional development as much as practical in that area. This alternative would produce approximately 124 MMBF by harvesting about 6,836 acres. About 134 miles of new road would be constructed, mostly on the currently un-roaded por-

tion of East Kuiu Island. A log transfer facility and small camp would be developed in the No Name Bay vicinity. This alternative provided the basis for Alternative 3, and has essentially the same theme as that alternative.

Alternative 4.1 - Unlike the two previous alternatives which focused development in one part or another within the study area, this alternative would spread the development throughout the study area in effort to minimize the impacts in any one location and to preserve options for the future in the more sensitive locations within the study area. Under this alternative, development on the west side of Port Camden would be deferred. Although less extensive than in Alternative 3.1, a road system would be developed along the eastern side of the island. This alternative would harvest 117 MMBF from 5,668 acres and build 88 miles of new road. It would also include a log transfer facility and a logging camp at No Name Bay.

In addition to the alternatives eliminated from detailed study, there is direction common to all alternatives that precluded detailed study of development in particular locations within the study area. The most significant of these are the west side of Security Bay and portions of the Kadake Bay drainage. These areas contain rivers eligible for Wild and Scenic River designation. They are also areas considered to be valuable for their old-growth habitat and subsistence resources. These areas were visited on the ground by the IDT, but it was decided to defer further consideration of development in these areas at this time in order to allow consideration of whether the rivers should be recommended as Wild and Scenic through the revision of the TLMP, to protect the old-growth habitat, and to protect the subsistence uses.

Another element that was considered, but eliminated from detailed study, was a possible log transfer facility (LTF) at Port Camden. Since much of the timber to the east of Port Camden is in relatively low volume stands and requires considerable investment in road building, the contribution of this area to the overall economic desirability of the offering is fairly low. A log transfer facility at Port Camden would have improved the situation by reducing the transportation related costs for the timber coming from this area. However, because of the subsistence concerns in Port Camden, and the lack of suitable location (U.S. Department of Commerce, National Marine Fisheries Service, report dated April 9, 1991) an LTF in Port Camden was eliminated from further consideration.

Direction Common to All Alternatives

This section highlights some of the direction that is followed in each of the alternatives. Most of this direction is based on existing laws, regulations, or agency policy.

Cultural Resources - All roads and harvest units occurring within the cultural resource high probability zone were field surveyed according to a plan approved by the State Historic Pres-

ervation Officer. No cultural resources eligible for inclusion on the National Register of historic Places will be effected.

Wild and Scenic Rivers - Two rivers in the study area, Kadake Creek and an unnamed creek at the head of Security Bay (sometimes referred to as Fall Dog Creek) have been determined to be eligible for inclusion in the Wild and Scenic River System. This eligibility determination is based on unique values that have been identified as part of the revision process of the Tongass Land Management Plan. These values will be protected in all alternatives considered in this analysis. The final TLMP will determine whether these rivers are suitable for inclusion to the Wild and Scenic River System. No harvest or related activities will be considered in any alternative within the watersheds of the segments found to be eligible for Wild River status.

Economics - All alternatives will be designed to be economically viable. The mid-market test as described in the USDA Forest Service Timber Sale Planning Handbook will be used to assess economic viability.

Streamside Protection - The riparian habitat along all anadromous fish streams and resident fish streams that are tributary to anadromous fish streams will be protected by leaving buffers of at least 100 feet between any harvest units and the streambanks. Best Management Practices, as defined in the Region 10 Soil and Water Conservation Handbook (FSH 2509.22), will be implemented to ensure the protection of riparian habitat on streams or portions of streams not protected by such buffer zones (TTRA).

Proportional Harvest - All alternatives are designed so that the proportion of high volume stands (volume classes 6 and 7) within each management area would not decrease as a result implementing the alternative. Management Area S04 contains 25.5% high volume stands and Management Area S09 contains 7.4% high volume stands. The proportion of high volume stands proposed for harvest within each management area will maintain or increase these percentages. (The Tongass Timber Reform Act requires such proportionality on the long-term sale areas.)

Clearcut Acre Limitations - Openings created by clearcuts are generally limited to 100 acres in size. As required by the National Forest Management Act, openings over 100 acres are considered and allowed only when necessary to meet specific resource objectives. (This is required by the National Forest Management Act and the Alaska Regional Guide.)

Marbled Murrelets - Marbled murrelets are known to occur in the waters around the analysis area. No known nests have been located. If a nest site is located, it is recommended that a 30-acre buffer surrounding the nest be provided. Roads can enter this buffer if unavoidable, but every effort should be made to protect the nest site.

Goshawks - No goshawk (*Accipiter gentilis*) nests are known to exist in the study area. Fewer than 10 nests of this species have ever been reported in southeast Alaska. The goshawk is not classified as Threatened and Endangered nor is it recognized as a Regional

Sensitive Species pursuant to FSM 2670, therefore there are currently no specific standards for protecting goshawk nests or habitat.

There is a growing concern regarding the goshawk viability on the Tongass National Forest given the perceived habitat requirements and limited number of known nest sites. The U.S. Fish and Wildlife Service has been petitioned to consider the goshawk as a Federally listed Threatened or Endangered species. The goshawk has also been recommended for consideration as a Sensitive Species for the Alaska Region of the Forest Service.

If a goshawk nest is located in the study area, the "Interim Habitat Management Recommendations for the Northern Goshawk; Tongass National Forest 1992" will be implemented. A copy of these guidelines is located in the appendices of this document. The purpose of these guidelines is: "To provide interim management recommendations that will sustain goshawk nesting habitats and retain management options on the Tongass National Forest while achieving Tongass Land Management Plan goals".

None of these provisions constitute land allocations. They are standards and guidelines applicable to this project only. The intent is to provide options for goshawk habitat until it can be determined whether Regional standards for the protection of goshawk habitat are warranted.

Alternatives Considered in Detail

This section describes each alternative. The description includes a discussion of how specific resources were addressed in the design of the alternative and also lists proposed harvest units by VCU for each alternative. All alternatives are consistent with the Tongass Land Management Plan as amended in 1986. The alternatives have also been designed to be consistent with the draft revised TLMP.

Alternative 1 (No Action Alternative)

This is the no action alternative which is required by NEPA. It assumes no change in current management. At the current rate of harvest on Kuiu Island, all the timber volume made available for harvest through previous decisions is expected to have been harvested by the time a decision is issued on this project. Because no previously authorized harvestable volume will remain in the project area, the effects of this no action alternative are the same as an alternative that would halt previously authorized harvest activities. This alternative assumes that contractual requirements for timber volume could be met by making timber available from areas other than Kuiu Island. Because of this, the no action alternative does not include consideration of, nor analysis of, the social, environmental, or economic costs and benefits of closing the mills in Sitka and Wrangell. For the same reason, consideration of the costs and benefits of operating the mills is beyond the scope of the action alternatives.

Alternative 2

Implementation of this alternative would include harvesting approximately 102 million board feet (MMBF) of timber from 4,762 acres of forest. Most of the harvest would be by clearcutting, however 1.3 MMBF would be harvested from VCU 399, unit 19 using a group selection silviculture system designed to mimic natural blowdown in order to enhance protection of wildlife habitat and visual quality. Helicopter yarding would be employed on 431 acres; the remainder would be harvested using a shovel loader or cable based systems. About 56 miles of new forest development roads and 25 miles of temporary roads would be constructed.

This alternative would minimize entry in the mostly un-roaded East Kuiu Management Area, but instead concentrate harvest in the already developed portions of North Kuiu. By deferring harvest on east Kuiu, the primitive character of this area is maintained through the life of this timber offering, but the concentrated harvest on north Kuiu will result in a near maximum level of development and harvest in some watersheds.

Some important elements of this alternative are the protection of the wild and scenic river potential of Kadake Creek and Fall Dog Creek (Security Bay); and the maintenance of large blocks of old-growth habitat in west Security Bay and near the mouth of Kadake Creek. Specific resources will be addressed as follows:

Fish: Implement Tongass Timber Reform Act minimum 100-foot buffers along Class I streams and Class II streams that are tributary to Class I streams. Implement Soil and Water Handbook (FSH 2509.22) direction on Class III and remaining Class II streams.

Marine Environment: Limit log transfer facilities (LTF's) to those with existing permits (Rowan and Saginaw Bays).

Recreation: Facilitate roaded recreation opportunities. Provide access road to beach north of Rowan Bay and pursue opportunities for building a boat ramp at Port Camden.

Subsistence: Limit management activities in specific high use areas such as in parts of Security Bay, Kadake Creek, and Port Camden. Where activities are planned in these areas, limit the extent and location, so as to minimize conflicts with subsistence uses.

Timber: Maximize returns to the Treasury and maintain future management options by limiting investments in road construction and KV projects. Use non-standard logging systems to increase access to timber base.

Visual Resource: Allow change as needed to meet timber and other resource management objectives. Activities could dominate seen areas, meeting the maximum modification VQO.

Water Quality: Meet goals of Clean Water Act by implementing and monitoring BMPs. Do not exceed watershed sensitivity analysis thresholds of concern.

Wildlife Habitat: Identify acres of old-growth blocks, beach fringe habitat, estuary fringe habitat and riparian habitat to be managed to provide old-growth habitat conditions.

Enhancement Opportunities: There is potential for a KV funded fisheries enhancement project in Hiller Creek (ADF&G stream 105-32-69). This project would remove a barrier to fish passage and is near unit 419-3.

Table 2-1

Proposed Timber Harvest Units for Alternative 2¹

VCU	Unit #	Unit Acres	Unit Volume	VCU	Unit #	Unit Acres	Unit Volume
399	13	76	1,501	402	27	16	352
	16	86	3,345		28	8	176
	17	67	1,774		29H	23	506
	18	55	2,291		30	31	761
	19H	52	1,307		31H	9	198
	20	33	528		32H	21	453
	21	76	1,114		34	18	396
	22	49	1,024		35	27	631
VCU Totals		494	12,884		36	41	902
400	8	56	1,206		37	46	976
	9	58	1,495		41	50	1,082
	11H	25	771		42H	55	1,201
	12H	71	2,143		45	39	952
	13	109	3,591		46	31	547
	15H	12	481		47	14	323
	18H	73	2,671		48	29	638
	20	67	2,908		49	20	359
	21	42	920	VCU Totals		830	17,728
VCU Totals		513	16,186	419	1	33	665
402	16	24	501		2	35	599
	17	8	176		3	81	1,431
	18H	67	1,429		4	88	1,612
	20	35	805		5	6	78
	21	103	1,933		27	86	1,307
	23	9	117		28	25	505
	24	51	1,104		29	88	2,187
	25	29	638		30	71	1,364
	26	26	572	VCU Totals		513	9,748

Table continued on next page

Table 2-1 continued

Proposed Timber Harvest Units for Alternative 2¹

VCU	Unit #	Unit Acres	Unit Volume	VCU	Unit #	Unit Acres	Unit Volume
420	15	109	1,822	420	42	20	296
	16	48	678	(cont.)	43	6	105
	17	173	3,490		45	107	2,057
	18	48	723		46	34	712
	19	89	1,166		47	49	763
	20	80	1,643		48	48	930
	21	90	1,458		49	23	416
	22	23	425	VCU		1,771	31,401
	23	12	228	Totals			
	24	68	1,307	421	37	71	1,202
	25	68	1,307		38	90	1,800
	26	50	812		40	28	553
	27	8	149		41	40	872
	28	66	1,128		45	61	2,005
	30	178	2,773		46	14	236
	31	6	123		49	99	2,624
	32	104	2,000		50	38	782
	33	15	195		51	57	1,410
	34	7	145		52	86	2,117
	35	5	101		53H	23	506
	36	53	932		54	34	442
	37	57	1,074	VCU		641	14,549
	38	50	1,037	Totals			
	39	15	267				
	40	26	419				
	41	36	720				
Total Acres = 4,762							
Total Volume = 102.496 MMBF							
Source: Gerdes, 1992							
¹ Unit volume in net sawlog MBF							

Alternative 3

This alternative would schedule most of the harvest for this offering on East Kuiu. Implementation of this alternative would include the harvesting of approximately 116 MMBF of timber from 5,527 acres of forest. Most of the harvest would be by clearcutting, however approximately 0.6 MMBF would be harvested from VCU 416, unit 7 using uneven-aged harvest as part of a research effort on alternative regeneration systems. Helicopter yarding would be employed on 379 acres and the remainder would be yarded by shovel loader or cable systems. About 83 miles of new forest development roads and 37 miles of temporary roads would be constructed. Another key element of this alternative is construction of a new log transfer facility at No Name Bay. Specific resources will be addressed as follows:

Fish: Implement Tongass Timber Reform Act minimum 100-foot buffers along Class I streams and Class II streams that are tributary to Class I streams. Implement BMPs on Class III and remaining Class II streams.

Marine Environment: Use LTFs as needed to provide for the efficient transportation of forest products (Rowan, Saginaw, and No Name Bay).

Recreation: Provide road access to beach north of Rowan Bay and pursue opportunities to construct boat ramps in Port Camden and Threemile Arm. ROS changes occur as needed to meet timber and other resource management objectives. Protect recreation experience associated with canoe/Kayak portages.

Subsistence: Allow for timber harvest and related activities while providing for access, and relying on fish and wildlife management strategies to protect subsistence resources.

Timber: Maximize investment in road system to facilitate future access.

Visual Resource: Allow change as needed to meet timber and other resource management objectives. Landscapes on North and East Kuiu would be dominated by harvest activities.

Water Quality: Meet goals of Clean Water Act by implementing and monitoring BMPs. Do not exceed watershed sensitivity analysis thresholds of concern.

Wildlife Habitat: Identify old-growth blocks, estuary habitat, beach fringe habitat, and riparian habitat to be managed to provide old-growth habitat conditions for the life of the project.

Enhancement Opportunities: Potential for four KV funded fisheries enhancement projects located near Units 419-3, 418-6, 417-2, and 417-19.

Table 2-2

Proposed Timber Harvest Units for Alternative 3¹

VCU	Unit #	Unit Acres	Unit Volume	VCU	Unit #	Unit Acres	Unit Volume
400	11H	25	771	416 (cont.)	6	95	2,104
	12H	71	2,143		7	21	567
	15H	12	481		8	64	1,408
	18H	73	2,671		9	36	774
	20	67	2,908		10	84	1,848
VCU Totals		248	8,974		11	79	1,720
402	18H	67	1,429		12	21	399
	23	9	117		13	32	704
	24	51	1,104		14	37	760
	25	29	638		15	30	633
	26	26	572		16	75	1,768
	27	16	352		19	56	1,196
	28	8	176		20	98	1,868
	29H	23	506		21	21	484
	30	31	761		22	33	699
	31H	9	198		27	32	587
	32H	21	453		28	51	1,115
	42H	55	1,201		30	94	2,404
	45	39	952		31	36	783
	46	31	547	VCU Totals		1,209	27,516
	47	14	323	417	1	60	1,452
	49	20	359		2	74	1,187
VCU Totals		449	9,688		3	35	752
416	1	68	1,397		4	79	1,522
	3	58	1,788		5	70	1,504
	4	37	1,155		6	63	1,098
	5	51	1,355		7	45	855
					8	26	491

Table continued on next page

Table 2-2 continued

Proposed Timber Harvest Units for Alternative 3¹

VCU	Unit #	Unit Acres	Unit Volume	VCU	Unit #	Unit Acres	Unit Volume
417	11	41	839	418	17	20	583
	12	11	242	VCU		743	15,133
	13	54	1,333	Totals			
	14	30	606	419	1	33	665
	15	49	907		2	35	599
	16	56	998		3	81	1,431
	17	29	458		4	88	1,612
	18	72	1,778		5	6	78
	19	48	1,011		27	86	1,307
	20	69	1,293		28	25	505
	21	52	838		29	88	2,187
	22	56	1,704		30	71	1,364
	24	72	1,553			513	9,748
VCU Totals		1,091	22,421	420	16	48	678
418	1	34	785		18	48	723
	2	75	1,533		19	89	1,166
	4	65	1,412		20	80	1,643
	5	23	607		21	90	1,458
	6	85	1,582		22	23	425
	7	31	763		23	12	228
	8	30	642		24	68	1,307
	10	81	1,782		25	68	1,307
	11	81	1,692		26	50	812
	12	66	1,389		27	8	149
	13	62	914		28	66	1,128
	14	22	376		30	178	2,773
	15	34	586		31	6	123
	16	34	487		32	104	2,000

Table continued on next page.

Table 2-2 continued

Proposed Timber Harvest Units for Alternative 3¹

VCU	Unit #	Unit Acres	Unit Volume	VCU	Unit #	Unit Acres	Unit Volume
420	33	15	195	420	42	20	296
(cont.)	34	7	145	(cont.)	43	6	105
	35	5	101		49	23	416
	36	53	932	VCU		1,251	21,627
	37	57	1,074	Totals			
	38	50	1,037	421	53H	23	506
	39	15	267	VCU		23	506
	40	26	419	Totals			
	41	36	720				
Total Acres = 5,527							
Total Volume = 115.613 MMBF							
Source: Gerdes, 1992							
¹ Unit volume in net sawlog MBF							

Alternative 4

This alternative will maintain options through the life of this offering by spreading the harvest over both North and East Kuiu, but deferring harvest in the more sensitive parts of both management areas. Harvest units will be designed in a manner that provides for a high degree of resource protection. Investments in mitigation and capital investments will be high.

Implementation of this alternative would include the harvesting of approximately 118 MMBF of timber from 5,203 acres of forest. Most of the harvest would be by clearcutting, however approximately 0.6 MMBF would be harvested from VCU 416, unit 7 using uneven-aged harvest as part of a research effort. An additional 1.3 MMBF would be harvested from VCU 399, unit 19 using group selection. Helicopter yarding would be employed on 431 acres, the remainder would be yarded by shovel loader or cable systems. About 60 miles of new forest development roads and 32 miles of temporary roads would be constructed. Another key element of this alternative is construction of a new LTF on a point outside the mouth of No Name bay. This new LTF location was developed in response to public concerns regarding the need for an ice-free anchorage at the Fantasy Island location. Specific resources will be addressed as follows:

Fish: Implement Tongass Timber Reform Act minimum 100-foot buffers along Class I streams and Class II streams that are tributary to Class I streams. Implement BMPs on Class III and remaining Class II streams. Provide additional managed buffers to reduce risk of blowdown.

Marine Environment: Use LTFs as needed to provide for the efficient transportation of forest products (Rowan Bay, Saginaw Bay, and No Name Bay).

Recreation: Protect recreation setting in high interest areas (ie. Security Bay and Kadake Bay). Pursue opportunities to construct boat ramp in Threemile Arm and protect recreation experience associated with canoe/kayak portages.

Subsistence: Limit management activities in specific high use areas such as in parts of Security Bay, Kadake Creek, Port Camden, etc. Where activities are planned in these areas, limit the extent and location so as to minimize conflicts with subsistence uses.

Timber: Combine a moderate level of capital investment with a moderate level of returns to the Treasury.

Visual Resource: Defer activities in the Port Camden and Reid Bay areas. Landscapes in the East Kuiu area will appear developed, yet activities will work with the characteristic landscape.

Water Quality: Meet goals of Clean Water Act by implementing and monitoring BMPs. Do not exceed watershed sensitivity analysis thresholds of concern.

Wildlife Habitat: Identify old-growth blocks, estuary fringe habitat, beach fringe habitat, and riparian habitat to be managed to provide old-growth habitat conditions.

Enhancement Opportunities: Three KV funded fisheries enhancement projects are proposed located near units 417-2, 417-19, and 418-6.

Table 2-3

Proposed Timber Harvest Units for Alternative 4¹

VCU	Unit #	Unit Acres	Unit Volume	VCU	Unit #	Unit Acres	Unit Volume
399	13	76	1,501	402 (cont.)	26	26	572
	16	86	3,345		27	16	352
	17	67	1,774		28	8	176
	18	55	2,291		29H	23	506
	19H	52	1,307		30	31	761
	20	33	528		31H	9	198
	21	76	1,114		32H	21	453
	22	49	1,024		34	18	396
VCU Totals		494	12,884		35	27	631
400	8	56	1,206		36	41	902
	9	58	1,495		37	46	976
	11H	25	771		41	50	1,082
	12H	71	2,143		42H	55	1,201
	13	109	3,591		45	39	952
	15H	12	481		46	31	547
	18H	73	2,671		47	14	323
	20	67	2,908		48	29	638
VCU Totals	21	42	920		49	20	359
		513	16,186	VCU Totals		830	17,728
402	16	24	501	416	1	67	1,384
	17	8	176		3	58	1,788
	18H	67	1,429		4	37	1,155
	20	35	805		5	51	1,355
	21	103	1,933		6	95	2,104
	23	9	117		7	21	567
	24	51	1,104		8	64	1,408
	25	29	638	VCU Totals		393	9,761

Table continued on next page.

Table 2-3 continued

Proposed Timber Harvest Units for Alternative 4¹

VCU	Unit #	Unit Acres	Unit Volume	VCU	Unit #	Unit Acres	Unit Volume
417	1	60	1,452	418 (cont.)	7	31	763
	2	74	1,187		10	81	1,782
	3	35	752		11	81	1,692
	4	79	1,522		12	66	1,389
	5	70	1,504		13	62	914
	6	63	1,098		14	22	376
	7	45	855		15	34	586
	8	26	491		16	34	487
	10	20	440		17	20	583
	11	41	839	VCU		713	14,491
	12	11	242	Totals			
	13	54	1,333	419	27	86	1,307
	14	30	606		28	25	505
	15	49	907		29	88	2,187
	16	56	998		30	71	1,364
	17	29	458			270	5,363
	18	72	1,778	420	45	107	2,057
	19	48	1,011		46	34	712
	20	69	1,293		47	49	763
	21	52	838		48	48	930
	22	56	1,704			238	4,462
	24	72	1,553	421	37	71	1,202
VCU		1,111	22,861		38	90	1,800
Totals					40	28	553
418	1	34	785		41	40	872
	2	75	1,533		45	61	2,005
	4	65	1,412		46	14	236
	5	23	607				
	6	85	1,582				

Table continued on next page

Table 2-3 continued

Proposed Timber Harvest Units for Alternative 4¹

VCU	Unit #	Unit Acres	Unit Volume		VCU	Unit #	Unit Acres	Unit Volume
421	49	99	2,624		421	53H	23	506
(cont.)	50	38	782		(cont.)	54	34	442
	51	57	1,410		VCU		641	14,549
	52	86	2,117		Totals			
Total Acres = 5,203								
Total Volume = 118.285 MMBF								
Source: Gerdes, 1992								
¹ Unit volume in net sawlog MBF								

Acres Managed to Provide Old-Growth Habitat Conditions

The Tongass Land Management Plan 1979, as Amended Winter 1985-86 (TLMP), requires that sufficient old-growth habitat be provided to achieve wildlife habitat goals. The TLMP provides estimates of percentage of old-growth habitats in each of several habitat categories that were anticipated to be necessary to meet habitat objectives.

The areas to be managed to provide old-growth conditions for the duration of this project are made up of the old-growth habitat blocks, beach fringe, estuary fringe, and riparian buffers. The old-growth blocks were identified by the interdisciplinary team with help from representatives of the Alaska Department of Fish and Game. This combination of habitat types provides for both well distributed large blocks of old-growth habitat across the landscape and important travel corridors.

The acres that would be managed to provide old-growth habitat conditions under each alternative are displayed in Table 2-4. The acreage estimated in TLMP is also displayed for comparison. These areas are displayed on the existing condition map and the selected alternative map included in the Record of Decision.

Table 2-4

Acres Managed to Provide Old-Growth Habitat Conditions

VCU	TLMP Estimate	Alternative		
		2	3	4
398	471	952	952	952
399	1,849	3,954	4,417	3,954
400	1,701	11,952	11,962	11,952
401	717	11,267	11,267	11,267
402	1,726	3,584	3,651	3,584
416	1,675	3,194	3,142	3,179
417	845	4,154	4,038	4,060
418	590	5,971	5,449	5,478
419	1,096	2,267	2,267	2,271
420	2,470	6,008	6,194	6,037
421	1,119	7,930	7,940	7,930
Total	14,259	61,233	61,279	60,664

Figure 2-1

Acres to be Managed to Provide Old-Growth Habitat Conditions -- Alternative 2

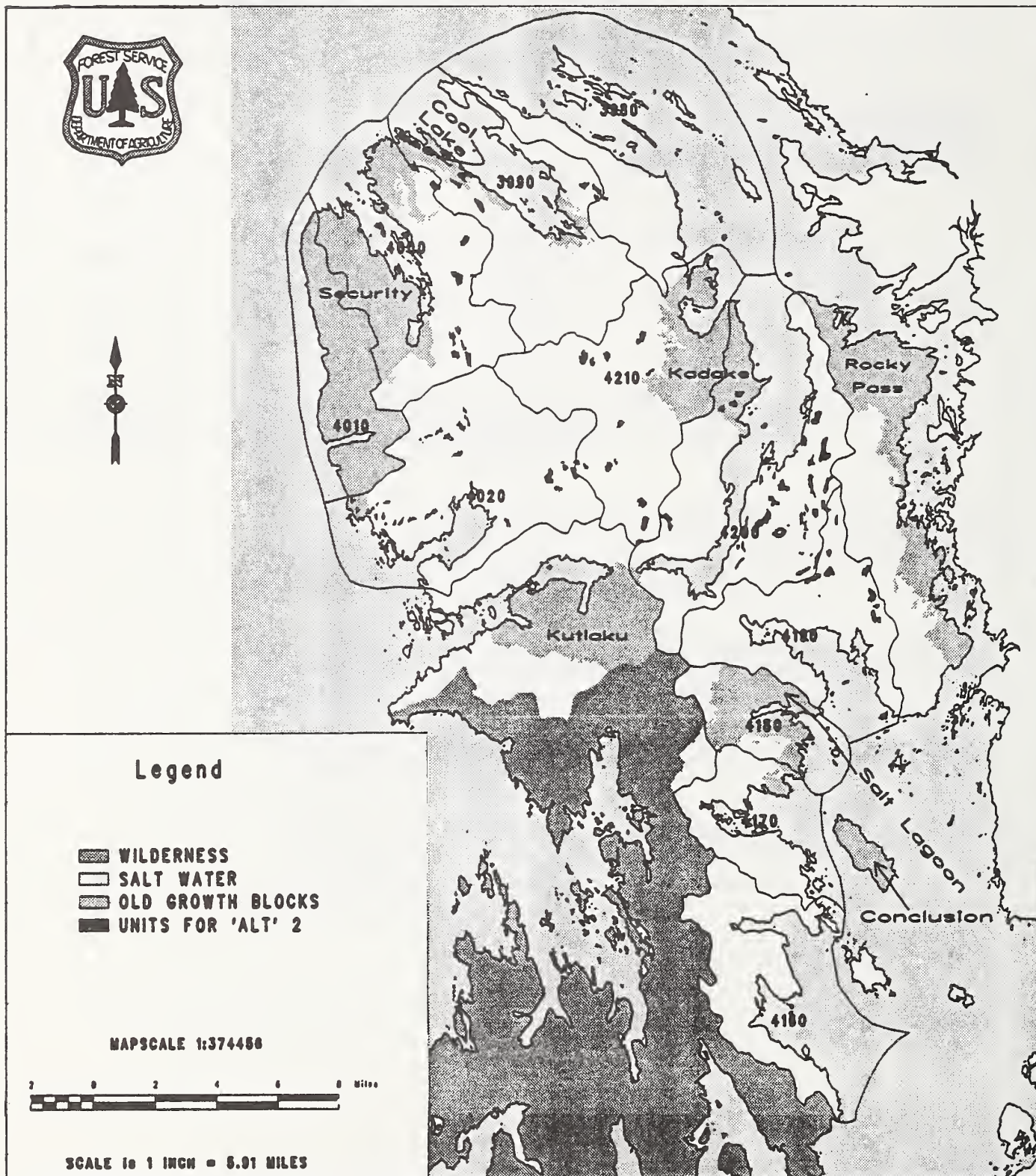


Figure 2-2

Acres to be Managed to Provide Old-Growth Habitat Conditions -- Alternative 3

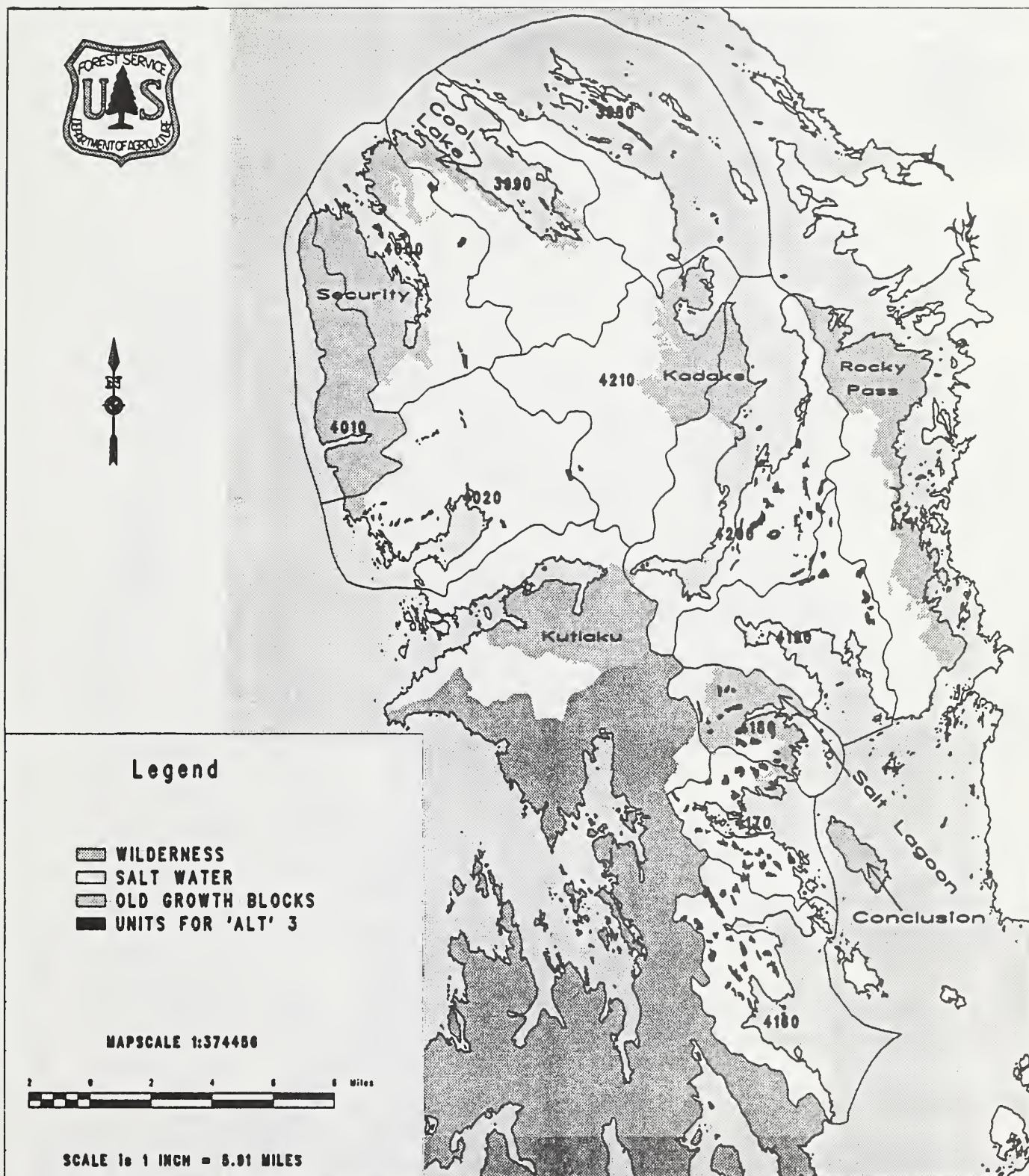


Figure 2-3

Acres to be Managed to Provide Old-Growth Habitat Conditions -- Alternative 4



Mitigation Measures Used in All Action Alternatives

The Forest Services uses a variety of mitigation measures in the design and implementation of timber management activities. Many of these mitigation measures are included in the Forest Service Manual and Handbooks, the Regional Guide, and the Tongass Land Management Plan. Avoiding potential negative resource effects is a key element of mitigation. This occurs by carefully planning the project so that activities are designed and located, to the greatest extent practicable, in a manner that reduces impacts. Primary examples of mitigation through avoidance include locating harvest units away from high hazard soils and areas with high blowdown hazard.

Other mitigation measures are actions taken during implementation to ensure that resources are protected. These actions and their site-specific application are documented on the unit and roads cards. (See Appendix A, Unit and Road Cards) These mitigation measures, and their effectiveness, are described below.

Best Management Practices

Best Management Practices (BMPs) are land management methods and practices designed to protect soil and water quality. The interdisciplinary team applies BMPs on a site-specific basis during project planning and implementation. This process is discussed in Chapter 3 and documented on the unit and road plans. For example, BMPs are applied during stream crossing design and construction, harvest unit design, and sale administration. The State of Alaska recognizes BMPs as the primary mechanism to control nonpoint source pollution from forest practices.

Tongass Timber Reform Act Streamside Buffers

In addition, TTRA mandates a 100-foot buffer on all Class I streams and on those Class II streams that flow directly into Class I streams. The 100-foot buffer is a minimum width. Many of the stream-side buffers in this project are wider than 100 feet in response to site-specific topographic conditions and blowdown risk. Past experience and research (NMFS, 1991) has shown these buffers to be effective in providing shading, bank stability, and a continued supply of large woody debris; all key elements in maintaining productive fish habitat.

Wildlife

Several mitigation measures are employed throughout this project to protect wildlife habitat. The most significant mitigation measure is the location of the harvest units. At the initial stages of project design, key habitats were located and mapped. These habitats included, beach fringe, estuary fringe, lake buffers, and blocks of old-growth habitat. Timber harvest units and roads were located outside of these habitats whenever practicable. Harvest unit locations were also designed with consideration for travel corridors between habitat types.

Other measures that will be used to mitigate impacts to wildlife including reserve tree retention (snags) where safe to do so, prescribing second growth management techniques such as

precommercial thinning, the use of group selection in winter deer habitat near Saginaw Bay, and the scheduling of harvest activities to avoid disturbance to bald eagle nesting and rearing activities. Although no known goshawk or marbled murrelet nests have been identified, specific measures to protect nests and rearing habitat are prescribed in the event that nests are located during implementation of this project.

Subsistence

Because most subsistence activities involve the harvesting of fish and game, mitigation measures that protect or enhance fish and game resources will also protect and enhance subsistence activities. In addition to protecting the key habitats mentioned above, areas known to be especially important for subsistence activities (such as Security Bay and Kadake Bay) were avoided during the design of the alternatives.

Cultural Resources

Based on inventory work done on Kuiu Island and elsewhere in southeast Alaska a model was developed to locate those areas where cultural resources are likely to be found (high probability zone). In addition to providing a basis for comparing potential effects to cultural resources, this model was used to identify high probability areas that were then intensively surveyed. If cultural resources are located during project implementation, appropriate mitigation will be designed in consultation with the Alaska State Historic Preservation Officer.

Recreation

Most of the recreation use within the study area is water based. The primary method of mitigation for recreation is protecting the visual quality of areas seen from the water. Depending on the alternative's theme, harvest units visible from saltwater are located and designed to reduce visual impact. Buffers along beaches, estuaries, streams and lakes also provide visual screening.

Monitoring

A monitoring program will be implemented as part of the project to insure that the objectives of the North and East Kuiu Project are being met. The specific items to be monitored are described in Appendix C, Monitoring and Implementation. The descriptions include the allowable variation for a particular item to be monitored and also a description of the corrective action to be taken if the allowable variation is exceeded.

Comparison of Alternatives

The comparison of alternatives draws together the conclusions from resource analysis presented throughout the document. It also presents the rationale leading to the identification of a preferred alternative. The following sections compare the environmental impacts of the alternatives on the basis of the detailed analysis presented in Chapter 3. The alternatives are also compared on the basis of how they respond to each of the significant issues. This section includes a summary of the economic effects.

Effects Comparison

Tables 2-5 and 2-6 provide a brief overview of the volumes and miles of road development by alternative. Table 2-7, Summary Comparison of Alternatives, provides a summary of the effects expected from each of the alternatives. More detail on this information is available in Chapter 3.

Table 2-5

Volume by Alternative (Net Sawlog)

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Volume in MBF	0	102	116	118

Source: Gerdes, 1992

Table 2-6

Proposed Forest Development Roads in Miles

VCU	Alt 1	Alt 2	Alt 3	Alt 4
398	0	1	0	1
399	0	4	0	4
400	0	3	0	3
401	0	0	0	0
402	0	5	4	5
405.1	0	0	3	3
416	0	0	18	5
417	0	0	18	19
418	0	0	10	9
419	0	8	8	3
420	0	28	22	1
421	0	7	0	7
Total	0	56	83	60

Source: Aiken, 1992

Table 2-7

Summary Comparison of Alternatives

Issue	Alternative 1	Alternative 2
	No Action	North Kuiu
Cultural Resources	No impacts.	No impacts to sites eligible for inclusion in the National Register of Historic Places.
Economics	The logging camp at Rowan Bay would be closed and the families and workers displaced.	Harvest volume would provide approx. 296 jobs over a three year period and provide \$ 9,856,000/year income to the local economy. Net stumpage value is positive at \$ 50.24/MBF.
Fish Habitat		
Riparian Habitat	No additional impact.	2.6 miles of Class I 100' buffers. 1.4 miles of Class I 100'+ buffers.
Road Crossings	No additional impact.	16 crossings of Class I streams.
Sediment production	No additional impact.	Application of BMPs will minimize sediment.
Marine Environment	No additional impact.	Existing LTFs at Rowan Bay and Saginaw Bay will be used. Increase in depth of the 30-acre bark accumulation at Rowan Bay and less than one acre accumulation at Saginaw Bay is expected.

Alternative 3	Alternative 4
East Kuiu	North and East Kuiu
No impacts to sites eligible for inclusion in the National Register of Historic Places.	No impacts to sites eligible for inclusion in the National Register of Historic Places.
Harvest volume would provide for approx. 337 jobs over a three year period and provide \$10,989,000/year income to the local economy. Net stumpage value is positive at \$ 9.04/MBF.	Harvest volume would provide for approx. 342 jobs over a three year period and provide \$11,389,000/year income to the local economy. Net stumpage value is positive at \$ 58.93/MBF.
6.1 miles of Class I 100' buffers. 2.7 miles of Class I 100'+ buffers.	5.1 miles of Class I 100' buffers. 3.1 miles of Class I 100'+ buffers.
45 crossings of Class I streams.	25 crossings of Class I streams.
Application of BMPs will minimize sediment.	Application of BMPs will minimize sediment.
Same as Alternative 2 with an additional new LTF constructed at Fantasy Island in No Name Bay. Impact of the new site will include intertidal habitat covered with shot rock and an estimated 3.3 acres of subtidal habitat covered with accumulating bark.	Same as Alternative 3 except the new LTF site is moved to a point outside of the mouth of the bay.

Table 2-7 continued

Summary Comparison of Alternatives

Issue	Alternative 1 No Action	Alternative 2 North Kuiu
Recreation	No additional impact.	Rowan Bay, Cool and Ledge Lakes and the Port Camden area will become roaded and developed.
Soils	No additional impact.	No roads would be located on high hazard soils. No high hazard soils would be harvested.
Subsistence	No additional impact.	There may be a significant restriction of subsistence use of deer.
Timber	No additional impact.	4,762 acres would be harvested. 56 miles of specified and 25 miles of temporary road would be constructed. Units meet proportionality requirements as specified in TTRA.

Alternative 3	Alternative 4
East Kuiu	North and East Kuiu
Most recreation places in the east Kuiu and Port Camden areas would be affected.	Impacts to existing recreation places and opportunities would occur in the east Kuiu area.
No roads would be located on high hazard soils. 75 acres of high hazard soils would be harvested.	No roads would be located on high hazard soils. No high hazard soils would be harvested.
There may be a significant restriction of subsistence use of deer.	There may be a significant restriction of subsistence use of deer.
5,527 acres would be harvested. 83 miles of specified and 37 miles of temporary road would be constructed. Units meet the proportionality requirements as specified in TTRA.	5,203 acres would be harvested. 60 miles of specified and 32 miles of temporary road would be constructed. Units meet the proportionality requirements as specified in TTRA.

Table 2-7 continued

Summary Comparison of Alternatives

Issue	Alternative 1 No Action	Alternative 2 North Kuiu
Visual Resource	Landscapes of Kuiu Island would be maintained in their current visual condition.	Harvest would be deferred in West Security Bay, Alvin and Reid Bays, the Salt Lagoon and No Name Bay. Activities in East Port Camden would dominate the seen area.
Water Quality	No additional impact.	Lowest risk of sedimentation. BMP implementation and monitoring will assure compliance with the Clean Water Act.
Wildlife		
Habitat Capability (Number of Animals)		
Sitka Black-tailed Deer	8,781	8,639
Black Bear	440	437
Marten	758	741
River Otter	266	266

Alternative 3	Alternative 4
East Kuiu	North and East Kuiu
Landscapes of Port Camden and east Kuiu Island would receive the greatest impact as a result of timber harvest.	Harvest in the east side of Port Camden would be deferred. The road into VCU 416 would stop north of Alvin Bay.
Activities would dominate the landscapes of the Salt Lagoon, Port Camden, and Alvin and Reid Bays.	Activities would dominate the landscapes of the Salt Lagoon and No Name Bay.
Highest risk of sedimentation.	Moderate risk of sedimentation.
BMP implementation and monitoring will assure compliance with the Clean Water Act.	BMP implementation and monitoring will assure compliance with the Clean Water Act.
8,667	8,639
439	439
739	740
266	266

Table 2-7 continued

Summary Comparison of Alternatives

Issue	Alternative 1	Alternative 2
	No Action	North Kuiu
Habitat Capability (cont.)		
Bald Eagle	543	541
Habitat Types		
Beach Fringe	No additional impact.	No additional impact.
Estuary Fringe	No additional impact.	No additional impact.
Streamside Riparian	No additional impact.	109 acres harvested -- less than 1% decrease in existing habitat.
Forested	No additional impact.	4,887 acres ¹ harvested -- 3% decrease in existing habitat.
Old-Growth Habitat Blocks	No additional impact.	Fragmentation only in Cool Lake Block will be minimized by group selection harvest.
¹ Acres of habitat include total acres of partial cut units.		
Source: Condon, 1992		

Alternative 3	Alternative 4
East Kuiu	North and East Kuiu
539	541
8 acres harvested --less than 1% decrease in existing habitat.	8 acres harvested -- less than 1% decrease in existing habitat.
0 acres harvested --no additional impact.	No additional impact.
109 acres harvested --less than 1% decrease in existing habitat.	135 acres harvested -- less than 1% decrease in existing habitat.
5,350 acres harvested -- 3% decrease in existing habitat	5,372 acres harvested -- 32% decrease in existing habitat.
Salt Lagoon Block has approximately 8% harvested. Units are designed to minimize fragmentation by providing travel corridor from Tebenkof Wilderness to Salt Lagoon.	Salt Lagoon Block has approximately 8% harvested. Units are designed to minimize fragmentation by providing travel corridor from Tebenkof Wilderness to Salt Lagoon. Fragmentation in Cool Lake Block will be minimized by group selection harvest.

Issue Comparison

The issues that this analysis focuses on are described in Chapter 1. What follows is a discussion of how each of the alternatives respond to these issues.

Issue 1: CULTURAL RESOURCES - How should timber management activities be designed to protect cultural resources?

A probability model has been applied to each alternative to gauge the potential effect to cultural resources. Generally, those alternatives which favor more development pose a greater threat to undiscovered cultural resources. The "no action" alternative by its very nature would constitute the least threat to cultural resources. Implementation of a 500-foot beach fringe buffer zone for all alternatives and a 1,000-foot estuary buffer zone for most alternatives has effectively eliminated the areas of highest potential for cultural resources. Results of field surveys indicate none of the alternatives will effect significant sites, that is, those eligible for inclusion in the National Register of Historic Places.

Tlingit totem pole



Issue 2: ECONOMICS - How will the project effect the health of the economy of south-east Alaska? Is the proposed project economically efficient?

The baseline for comparison is the No Action Alternative (Alternative 1). Under this alternative all timber previously made available to APC on Kuiu Island would be harvested by the end of the 1992 operating season. This alternative assumes that no further volume would be made available to support existing operations at Rowan Bay for the near future. This alternative would result in the following impacts to the local economy:

1. The logging camp at Rowan Bay would be forced to close. A total of approximately 85 (APC 1981-86 and 1986-90 SEIS, USDA Forest Service, 1989) jobs would be lost or relocated and several families would be forced to move from Rowan Bay if the volume to the camp were not replaced.
2. The annual production from Rowan Bay supports approximately 96 jobs in the sawmill and pulp production industries (APC 1981-86 and 1986-90 SEIS, USDA Forest Service, 1989). The No Action Alternative assumes that production lost from Rowan Bay will have to be made from elsewhere so the jobs in the mills in Sitka and Wrangell would not be impacted. However, there would be no employment generated by this project.
3. The jobs described under items 1 and 2 above are considered direct employment; that is they are a direct result of the timber harvest and production. For each one of those jobs that is eliminated, there is an additional 0.7 jobs in the indirect and induced categories that will be lost (Condon, 1991). (Indirect and induced jobs are those jobs in sectors of the economy that provide goods and services to the logging, sawmill, and pulpmill sectors and also to the families of those people employed in those primary sectors.) In addition to the lost employment, there would be lost income that would be felt throughout the economy of southeast Alaska.

Under Alternatives 2 through 4 the current rate of production at Rowan Bay would be maintained. The contribution to the economy of southeast Alaska from the logging activity on Kuiu would continue at its current level. This includes over 300 jobs in all areas of the economy. If all of the volume made available by this project were harvested over a three year period, the employment would be greatest under Alternative 4 which would support approximately 342 jobs per year for the three years. Alternative 2 would be next with 296 jobs, and Alternative 3 would support the least jobs of the action alternatives with 237 jobs (Table 2-8). There is no guarantee that employment rates will actually differ under any of the alternatives since harvest and production rates are most likely to fluctuate in response to market conditions.

Table 3-8

Employment Impacts (# of Jobs Produced by this Project)

	Alt 1	Alt 2	Alt 3	Alt 4
Direct	0	160	182	185
Indirect and Induced	0	136	155	157
Total Employment	0	296	237	342

Source: Condon, 1992

This issue of economics was raised in part over concern that logging activity on Kuiu might adversely effect other sectors of the economy, most notably tourism and commercial fishing. Based on the effects analysis for recreation and fish in Chapter 3 of this FEIS, there is no evidence that either of these sectors will be noticeably effected by any of the alternatives. As explained in chapter 3 of this FEIS, fish production and recreation opportunities will not be impacted by the proposed action in a way that could materially effect income and employment opportunities.

The second part of the economic issue has to do with the economic efficiency of the alternatives. The data in the following table suggests that all of the action alternatives are economically viable. These estimates are based on the mid-market selling price for timber from Kuiu Island under the current contract terms.

Table 2-9

Timber Cost and Value Summary

	Alt 2	Alt 3	Alt 4
Volume (MMBF Sawlog)	102	116	118
Selling Value (M\$/MBF)	\$ 337.80	\$ 340.07	\$ 338.99
Costs (M\$)			
Stump to Truck	\$ 102.84	\$ 103.17	\$ 95.85
Transportation	\$ 56.49	\$ 60.13	\$ 47.36
Temporary Roads	\$ 16.39	\$ 21.0	\$ 18.27
Other Temp Develop.	\$.50	\$.90	\$ 0.88
Specified Roads	\$ 66.46	\$ 100.08	\$ 70.21
Profit and Risk	\$ 44.88	\$ 45.75	\$ 47.49
Net Stumpage Value	\$ 50.24	\$ 9.04	\$ 58.93

Source: Gerdes, 1992

Issue 3: FISH - How would fisheries habitat be managed and what effects would timber harvest and related activities have on fisheries habitat?

The No Action Alternative provides the baseline for comparing the effects of the alternatives on fisheries habitat. The evaluation presented in Chapter 3 shows that the potential effects on fisheries habitat are minimal under all alternatives. All streams that support runs of salmon or steelhead, as well as their tributaries that support populations of resident fish, are protected on both sides by buffers of at least 100 feet.

Table 2-10

Miles of Stream Buffer and AHMU Class by Alternative

	Class I			Class II		
	100-Foot Buffer		Extended	100-Foot Buffer		Extended
	One Side	Both Sides	Width	One Side	Both Sides	Width
Alternative 2	2.6	0.0	1.4	6.6	0.2	1.1
Alternative 3	6.1	0.0	2.7	8.2	0.4	1.9
Alternative 4	5.1	0.0	3.1	7.9	0.4	1.5

Source: Cariello, 1992

All other streams will be protected according to direction provided in the Alaska Region Aquatic Habitat Management Unit (AHMU) Guidelines (Forest Service 1986a) and by the specific mitigation measures listed on the road descriptions and unit plans.

Even though the impacts are expected to be minimal and therefore the risk of impact will be very low under any of the action alternatives, the extent of buffered fish streams, and the number of road crossings on fish streams are useful indicators of the relative risk to fish habitat presented by each of the alternatives.

Issue 4: MARINE ENVIRONMENT - If additional log transfer facilities (LTFs), are needed, how can they be designed and located in a manner that minimizes the effects on the marine environment?

The No Action Alternative would have the least effect on the marine environment by discontinuing the use of the Rowan Bay LTF. (This may not be true if this alternative would cause the timber industry to look to another location for a replacement supply of logs and as a result use, or construct another LTF.)

Of the three action alternatives, alternative 2 would have the least impact on the marine environment by restricting use of LTFs to the existing facilities at Rowan Bay and Saginaw Bay. In addition, Alternatives 3 and 4 would also involve constructing a new facility at No Name Bay.

Issue 5: RECREATION - How should recreation opportunities be protected or enhanced in the design of timber management activities?

All of the action alternatives increase roaded access to the interior of the island and provide road access to a potential day use beach site just north of Rowan Bay. Under Alternatives 1 and 2, VCUs 416, 417, and 418 would retain their unroaded character.

Issue 6: SOIL - How should timber management activities be designed to protect the soil resource? What effects would activities have on soils?

All alternatives are expected to equally meet or exceed Soil Quality Standards (FSH 2509.18 Soil Management Handbook R-10 Supplement 1/92), and therefore, have no measurable adverse effect on the long-term productivity of the soil.

The relative risk of excessive soil erosion from timber harvest can be rated in terms of the amount of timber harvest and road construction on hazardous soil types. Tables 2-11 and 2-12 display the risks associated with each alternative.

Table 2-11

Acres of Proposed Harvest by Soil Hazard Class ¹

Soil Hazard Class	Alternative			
	1	2	3	4
Low	0	1,855	1,900	2,268
Moderate	0	3,189	3,610	3,284
High	0	0	75	0
Total	0	5,044	5,585	5,552

¹ Acres include entire partial cut unit area.

Source: Kissinger, 1991

Table 2-12

Miles of Proposed Road by Soil Hazard Class ¹

Soil Hazard Class	Alternative			
	1	2	3	4
Low	0	53	82	64
Moderate	0	28	38	28
High	0	0	0	0
Total	0	81	120	92

¹ Includes both forest development and temporary road miles.

Source: Kissinger, 1991

Issue 7: SUBSISTENCE - How should timber management activities be designed to protect traditional subsistence uses? What effect would activities have on subsistence uses?

Action alternatives have been designed to avoid those areas of most importance to subsistence users (i.e., Security Bay, Saginaw Bay, Kadake Bay, and Port Camden). The proposed activities scheduled for implementation on Kuiu Island are anticipated to have very limited effects on subsistence users in the affected rural communities. We believe that these communities will continue their present intuitive hunting patterns based on availability, demand, and access. Competition does not appear to be a major factor as the study area has been closed to deer harvest since 1975. For each of the action alternatives, it has been determined that there may be a significant restriction for subsistence use of deer.

Issue 8: TIMBER MANAGEMENT - How should the project be designed to provide for efficient and productive long-term timber management?

There are approximately 23,000 acres of existing timber harvest units in the project area. It is anticipated that all proposed harvest units will be certified as having adequate regeneration resulting from natural occurring seed.

Tables 2-5 and 2-6 in Chapter 2 display the volume proposed by alternative and the miles of proposed forest development roads by alternative. Table 2-13 displays by alternative the acres of past harvest, acres of proposed harvest, total harvest, and the effects of total harvest on tentatively suitable (or operable) forest land, commercial forest land (CFL), and total land area.

Table 2-13

Acres of CFL to be Harvested by Action Alternative

Alternative	Past Harvest	Proposed Harvest	Total Proposed Harvest	Percent Harvested		
				Tentatively Suitable	CFL	Land Area
2	22,361	4,762	27,123	23%	16%	12%
3	22,361	5,527	27,889	23%	17%	12%
4	22,361	5,203	27,564	23%	17%	12%

Source: Gerdes, 1991

Table 2-14 displays by alternative how the proportionality requirement of the 1990 Tongass Timber Reform Act is achieved. The percent of acres in volume class stratas 6 and 7 remaining after harvest would not change more than one-half of one percent in any alternative.

Table 2-14

Percent of Volume Class Strata Proportionality in Alternatives

	Timber Base (acres) ²	Volume Class Strata 6 & 7 (acres)	Proportion (%)	% Change from Original Acres ³
Management Area S04				
Original Mgt. Area Total	92,616	23,628	25.51	
Alternative 1 (No Action) ¹	- 750	- 270		
Remaining Mgt. Area Total	91,866	23,358	25.43	-0.09%
Alternative 2	- 3,107	- 945		
Remaining Mgt. Area Total	89,509	22,683	25.34	-0.17%
Alternative 3	- 1,454	- 500		
Remaining Mgt. Area Total	91,162	23,128	25.37	-0.14%
Alternative 4	- 3,107	- 945		
Remaining Mgt. Area Total	89,509	22,683	25.34	-0.17%
Management Area S09				
Original Mgt. Area Total	48,493	3,593	7.41	
Alternative 1 (No Action) ¹	- 934	- 16		
Remaining Mgt. Area Total	47,559	3,577	7.52	0.11%
Alternative 2	- 2,896	- 79		
Remaining Mgt. Area Total	45,597	3,514	7.71	0.30%
Alternative 3	- 5,330	- 367		
Remaining Mgt. Area Total	43,162	3,226	7.47	0.06%
Alternative 4	- 3,449	- 316		
Remaining Mgt. Area Total	45,043	3,277	7.27	-0.13%

Source: Gerdes, 1992

¹ The No Action Alternative displays the effect of harvest that has occurred since the passage of the TTRA (November 28, 1990). This is the acreage base for other alternatives.

² Timber base - to assess proportionality, each of the TLMP Management Areas must be updated to determine the volume currently represented (as of November 28, 1990) within each management area. As a matter of policy, this excludes all Wilderness, TTRA designated LUD II areas, and Class I and applicable Class II streamside buffer zones established by the Tongass Timber Reform Act. The total remaining old-growth (herein called the timber base) within each management area is considered for proportionality.

³ A negative % indicates volume class strata 6 and 7 proportionality has declined from the original % as determined at the time of passage of TTRA (Nov. 28, 1990). Regional policy allows for a negative change of up to 0.50% as long as it can be made up in subsequent NEPA proposals.

Issue 9: VISUAL RESOURCE - How should timber management activities be designed to protect the visual resource and what effect would activities have on the landscapes of Kuiu Island? Where are the areas of highest scenic value and how will timber management activities be designed to protect these values?

Alternative 1 allows for areas of high scenic quality to be maintained in their current visual condition and evolve naturally. These areas include: North Rowan Bay, West Security Bay, Washington Bay, the Salt Lagoon, No Name Bay, Alvin and Reid Bays. Landscapes would be allowed to visually recover where harvest has occurred in the past.

Alternative 2 defers harvest in west Security Bay, Alvin and Reid Bays, the Salt Lagoon, and No Name Bay. Activities in east Port Camden would dominate the seen area, creating a high degree of visual change to this landscape.

Timber harvest activities proposed in Alternative 3 would dominate landscapes associated with the Salt Lagoon, Alvin and Reid Bays, and Port Camden. Impacts would be greatest to Port Camden and east Kuiu Island.

Of the action alternatives, Alternative 4 would have the least overall effect to the visually sensitive areas of Kuiu Island. The east side of Port Camden would not be entered for timber harvest at this time, maintaining the visual quality of this area. The road into VCU 416 would stop north of Alvin Bay, but harvest units within the watershed.

Issue 10: WATER QUALITY - How should timber management activities be designed to protect water quality? What effects would activities have on water quality?

Risk of sedimentation and associated impacts for each alternative can be compared by using indicators of potential disturbance. These indicators include timber harvest acreage, harvest on high hazard soils, stream mileage within and bordering clearcuts, road mileage, and stream crossing numbers. In all cases, Alternative 3 involves the greatest amount of disturbance. Alternative 1 involves the least disturbance. And while Alternatives 4 and 2 are quite similar, Alternative 4 has a slightly higher potential for sediment production.

Best Management Practices are applied equally to all alternatives. Each alternative will meet the goals of the Clean Water Act.

A watershed sensitivity analysis evaluated the potential cumulative watershed impacts caused by timber harvest activities. Browns Creek watershed will reach its threshold of concern value if Alternative 2 or 4 is implemented. All other watersheds, for all alternatives, will remain below the calculated threshold values.



Sitka Black-tailed Deer

Issue 11: WILDLIFE - How would wildlife habitat be managed and what effects would timber harvest and related activities have on wildlife habitat?

The No Action Alternative would reduce the impact to wildlife habitat that would otherwise occur to the current level following completion of harvest of the current operating period. No new harvest activity would occur and harvested stands would continue to mature.

All three action alternatives will have impacts on the wildlife indicator species. Marten and Sitka black-tailed deer will have the most impacts, however, the highest impacts would be a 3% decrease in the marten habitat in Alternative 3 and a 2% decrease in Alternatives 2 and 4 for deer. The remainder of indicator species habitats are impacted by 1% or less.

The habitat types of beach fringe, estuary, streamside riparian, and forested will be impacted to some extent by all three action alternatives--forested habitat by as much as 3% in all action alternatives. All other habitat types are reduced by less than 1%.

Of the seven large old-growth blocks located in the areas covered in this document, Conclusion, Kutlaku and Rocky Pass are not impacted by harvest. Cool Lake will be minimally impacted due to the group selection harvest. Fragmentation will not occur because units harvested will mimic naturally occurring openings through "group selection" (openings of less than two acres in size). The Kadake area will have minor harvest in all alternatives with the largest occurring in Alternatives 2 and 4 with 1.14% harvested. The Salt Lagoon old-

growth block will not be impacted by Alternative 2. Alternatives 3 and 4 will each harvest less than 8% of the area. This may cause some fragmentation of this block. Units are designed to minimize fragmentation by providing a travel corridor from the Tebenkof Wilderness to Salt Lagoon. The Salt Lagoon block was not included in the recommendations of the interagency committee.

Identification of the Forest Service Preferred Alternative

To recommend a preferred alternative, the Stikine Area Management Team evaluated the benefits and impacts of each alternative and gave particular consideration to how each alternative responded to the significant issues. Alternative 4, which would disperse development throughout the entire area, is tentatively identified as the Forest Service Preferred Alternative.

Chapter 3

Environment and Effects

Environment and Effects

Introduction

This chapter describes the environment that would potentially be modified by this project and the estimated consequences of the alternatives considered for the project. This chapter combines the "Affected Environment" and "Environmental Consequences" discussions required by the National Environmental Policy Act implementing regulations (40 CFR 1500). The environment and effects are described for each of ten key resources. These key resources correspond to the ten issues described in Chapter 1, and are presented in the same alphabetical order. Before the environment and effects are described, some background information about the natural resource and socio-economic setting is provided to give the reader a broader understanding of the setting for the study area.

Analyzing Effects

After the eleven key resources are described, the estimated effects (environmental consequences) upon the resource associated with implementation of each alternative are discussed. All potentially significant direct, indirect, and cumulative effects are described. Direct effects are those occurring at the same time and place as the initial action. Indirect effects are those that occur later in time, or are spatially removed from the activity. Cumulative effects result from the incremental effects of actions when added to other past, present, and reasonably foreseeable future actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Cumulative Effects

The analysis of cumulative effects requires the identification of reasonably foreseeable actions and then the projection, through some reasonable period of time, of the effects of those actions. Reasonably foreseeable actions for this analysis are interpreted to be those actions that are projected to occur until the end of the APC Long-Term Contract (the year 2011).

A "Life of the Sale Plan" was completed on 12/17/82 to project the reasonably foreseeable harvest to 2011 when the contract ends. The purpose of determining a projected harvest is to provide information to analyze reasonably foreseeable effects rather than to begin planning actual harvest units. The harvest projected through 2011 provides a basis for analyzing the cumulative effects of reasonably foreseeable actions. This projected harvest is not part of the decision being analyzed in this document. Units harvested through 2011 will be analyzed for site-specific impacts in future similar planning efforts.

The cumulative effects analysis utilizes the following assumptions:

- Laws, Standards and Guidelines from the Tongass Land Management Plan, and Best Management Practices (BMP's) for resource protection will be followed.
- All project planning would be accomplished in an interdisciplinary manner.
- All suitable commercial forest lands are equally subject to impacts.
- Stand management will rely primarily on even-aged management.
- The No-Action Alternative is considered as a delay in implementing the TLMP and therefore would not effect the assumptions used in the cumulative effects analysis.

The acres of timber harvest assumed to occur by the year 2011 are given in Table 3-1. The discussion of vegetation under the natural resource setting in this chapter includes a description of the successional changes following a disturbance such as timber harvest. These successional changes provide a basis for predicting effects that can be expected to occur as a result of changes in the vegetation.

Table 3-1

Cumulative Timber Harvest by 2011

VCU	Cumulative Harvest in 2011	Percent Harvested	
		Operable CFL	Land Area
398	1,548	30%	13%
399	5,455	35%	23%
400	6,812	36%	24%
401	566	17%	4%
402	7,786	43%	24%
416	2,662	21%	16%
417	2,355	29%	23%
418	1,235	21%	13%
419	2,422	24%	12%
420	4,334	31%	13%
421	7,244	39%	21%
Total	42,419	32%	10%

Source: Gerdes, 1991

Setting

Kuiu Island, at about 490,000 acres, is a moderately large island compared to other islands in the Alexander Archipelago. It is near the outer coast, but most of the western shore is blocked from the open ocean by Baranof Island. Elevation ranges from sea level to over 3,000 feet above sea level. Terrain is mostly mountainous with numerous glaciated valleys and some relatively flat plateaus. Most of the island is forested, but higher elevations have alpine vegetation. Rainfall amounts are high and summer temperatures are cool.

Threatened and Endangered Plant Species

There are no listed nor candidate threatened or endangered plant species located on Kuiu Island (Murray, 1987).

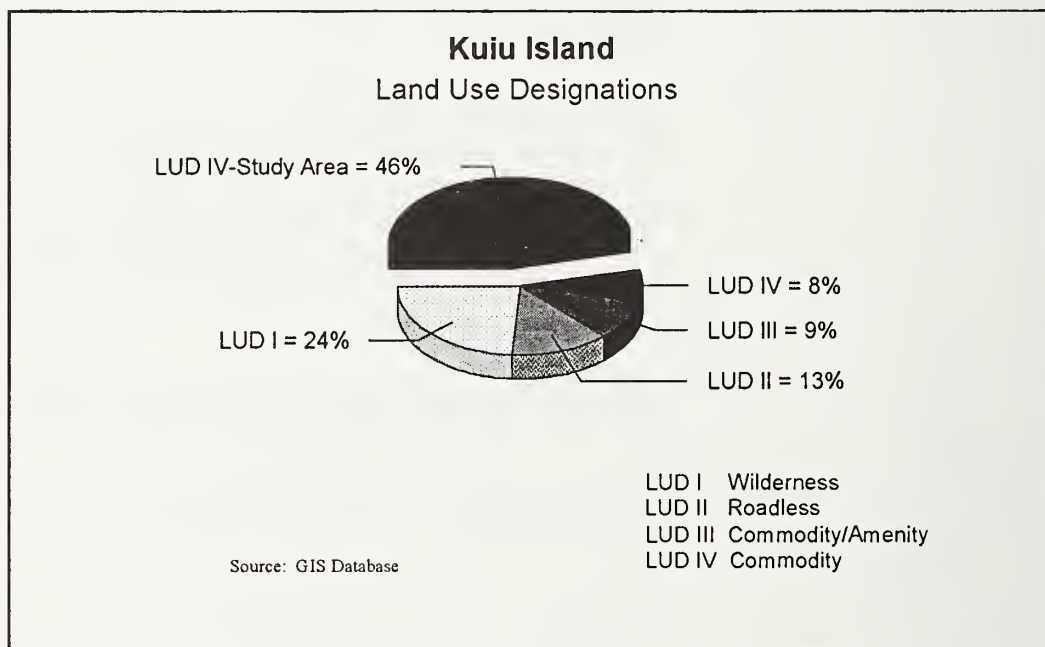
Management

The Tongass Land Management Plan provides for a variety of uses on Kuiu Island. The Tebenkof and Kuiu Wilderness Areas cover a total of 126,572 acres or about 25 percent of the island. About 65,000 acres, or 13 percent of the island is in a LUD II designation which requires that these lands be managed in a roadless state to retain their wildland character. (Roads may be permitted in these LUD 2 areas for very specific purposes such as vital transportation system linkages. One such existing road crosses through a portion of the Bay of Pillars Management Area which is designated LUD II.)

Much of the South Kuiu Management Area, S04, (nearly 46,000 acres or 9 percent of the island) is managed under a LUD III designation. These lands are managed for both amenity and commodity values in a manner that provides the greatest combination of benefits. Much of this Management Area is commercially forested, but only limited beach logging has occurred in the past. The rugged terrain does not lend itself to an interconnected road system.

Approximately 279,390 acres, or 57 percent, of Kuiu Island have been allocated to LUD IV management by the Tongass Land Management Plan. These acres are mostly on the north and east parts of the island with some on the southern tip. LUD 4 areas are to be managed to provide opportunities for intensive development of resources. Emphasis is primarily on market resources. All but 40,404 of the LUD IV acres are included in the study area for this project. The remaining LUD IV acres are in the Beauclerc Management Area on the south part of Kuiu Island. Limited beach logging has occurred in this Management Area in the past.

Figure 3-1



Socio-Economic Setting

This section describes the current social and economic environment within which the North and East Kuiu Project is being considered. Subsistence activities are part of the social fabric of southeast Alaska and are included in this description.

Impact Area

The Forest's extended zone of influence probably includes the entire Pacific Rim region considering the timber and mineral exports. Alaska's inside passage and the Tongass National Forest are world class recreation destinations. Much of the trade in southeast Alaska affects the Seattle metropolitan area. However, this impact analysis will focus on the primary area of influence of this project; an area encompassing the middle one-third of southeast Alaska. The area extends roughly from Wrangell on the southeast to Sitka on the northwest. Most of the employment and income impacts related to this project will occur within this geographic area.

Some management activities on the Tongass National Forest, especially timber harvest, generate revenues for the United States Treasury and the state of Alaska. As established by law, 25% of the net receipts from the Tongass National Forest are returned to the State of Alaska for distribution to local communities. These funds are also estimated as part of the impact analysis.

Population

The majority of the communities in southeast Alaska are small, isolated from each other, and only accessed by air or water. Sitka, with 8,160 residents, is by far the largest community within the primary impact area. Petersburg and Wrangell each have approximately 3,000, and the other communities in the impact area are much smaller. (The communities are described in more detail later in this section under "Community Profiles".)

The change in population levels in Southeast Alaska has been characterized by slow steady growth. With employment levels in the region's economy expected to be stable (in the case of fishing, fish processing, and forest products) to increasing slightly (in the case of mining and tourism), continued slow but steady growth is expected in the population of Southeast Alaska, including the impact area for this project.

Major Industries

Southeast Alaska's economy is characterized by its dependence on three major industries: forest products, fishing and fish processing, and tourism.

Forest Products

The harvesting and processing of forest products is the largest single source of employment in southeast Alaska. Total direct and indirect employment averaged 4,727 jobs from 1981 to 1990. Of the timber supplied from National Forest lands, most is associated with the two re-

maintaining 50 year timber sale contracts. (Timber Supply and Demand Study, USDA Forest Service, 1990)

Within the study area, the two major woods products facilities are located in Wrangell (APC dimension lumber mill) and Sitka (APC headquarters and pulp mill).

Commercial Fishing

Commercial fishing and fish processing is vitally important to the economy and culture of Southeast Alaska. Although commercial fisheries are prone to wide fluctuations, recent years have seen healthy catches, and salmon stocks seem to have recovered from the low levels of the early 1970's.

Within the impact area, both Petersburg and Sitka have large fish processing facilities and commercial fleets. All of the communities depend on commercial fishing, and for the smaller communities like Point Baker and Port Protection, commercial fishing is virtually the only significant sector of the cash economy.

Recreation and Tourism

Recreation and tourism are the fastest growing segments of the economy in Southeast Alaska. Alaska is increasingly recognized as a world class destination for tourists. From 1975 to 1986 the number of people visiting Southeast Alaska more than tripled.

Very large cruise ships stop at the larger ports of Ketchikan, Sitka, and Juneau. While the number of visitors on these large ships continues to increase, perhaps the fastest growing segment of the market is the small to medium-size cruise vessels that visit the smaller towns such as Kake, Wrangell and Petersburg. The smaller vessels provide a more personal and intimate look at Alaska and are able to travel some of the smaller waterways that would be off limits to the large ships.

Marketing studies by the Alaska Division of Tourism indicate that "scenery, forest, mountains, out-of-doors" and "wilderness, unspoiled, rugged" were the top interests appealing to potential visitors (Bright 1985). Resident recreation also increased during the 1980's as indicated by fishing and hunting license sales.

Community Profiles

The description of the socio-economic environment has so far focused on all of southeast Alaska. There are several communities that are likely to have more of an interest in the management of Kuiu Island than others due to their proximity and use of resources on the island. The following description of these communities will be useful in understanding potential impacts on these communities. The communities are listed in alphabetical order and are based on information from the "Analysis of the Management Situation" (USDA Forest Service, 1990, R10-MB-90) prepared as part of the Tongass Land Management Plan Revision process. Additional information about these communities is provided in the subsistence section of this chapter.

Kake

Kake residents use much of Kuiu Island for both commercial fishing as well as for subsistence fishing and hunting. Although Kake residents do rely on resources from Kuiu Island, there has been very little direct economic benefit to the economy of Kake from the development of the timber resource on Kuiu Island.

Petersburg/Kupreanof

Petersburg is a thriving community with an economy based on fishing, fish processing, government, timber, and a growing tourism industry. Petersburg is the location of the Stikine Area Forest Supervisor's Office and the Petersburg Ranger District office. Petersburg businesses receive some indirect benefit from the timber development at Kuiu Island through trade with Alaska Pulp Corporation and from the residents of the Rowan Bay logging camp.

Kupreanof does not have any commercial services available so the residents rely on Petersburg for most of their local economic and educational needs. As a result, the residents of Kupreanof contribute to the economy of Petersburg, but have no distinguishable economy of their own. Any further references in this document to the economy or residents of Petersburg is intended to include Kupreanof as well.

Point Baker/Port Protection

The economies peak with summer and fall fishing. Most residents own fishing boats and choose to live here for the independent and subsistence lifestyle the area offers. The main economic sector for Point Baker and Port Protection is fishing. Employment is highly seasonal. Subsistence fishing and hunting make an important contribution to both the lifestyle and the economy.

The interest of Point Baker and Port Protection residents seems to be primarily in the southern and eastern part of the project area. This area is used for both commercial fishing and subsistence activities.

Port Alexander

The primary economic sector is commercial fishing. Subsistence hunting and fishing are also important. Some of the commercial fishing and subsistence activities take place on or near the project area on Kuiu Island.

Rowan Bay

Rowan Bay is a logging camp located on the north west of Kuiu Island. It serves as the base for APC operations on Kuiu Island and also as a field office for Forest Service employees working on Kuiu Island. No Forest Service employees actually live there. Several APC employees and their families live there year-round. In addition to the APC facilities, there is a school and post office, but no commercial facilities. Many of the few hundred residents are transient, staying at Rowan Bay only for the logging season and then moving on. The camp is operated under permit from the Forest Service.

Sitka

Sitka is the largest community in the primary impact area for this project and is the site of the APC pulp mill. The pulp mill is the largest single employer in the community. It is also the permanent home for many APC employees who work on Kuiu Island.

Wrangell

Wrangell is the second largest community in the primary impact area for this project and is the site of the APC sawmill. The Wrangell sawmill is where many of the sawlogs harvested under the APC contract are processed.

Land Status

Timber sale planning has avoided areas that would require coordination or use agreements or where conflicts could arise such as special use permit areas, native allotment and native claim areas, state selection areas, private, withdrawn, and historic site areas with one exception. The state land selection at No Name Bay was approved by the Regional Forester in August, 1989, and is not expected to be conveyed in the near future. Any proposed logging units, forest development roads, and temporary roads within this selection have been reserved to the United States with state concurrence. The state will receive 90 percent of the stumpage for timber harvested within this selection. The United States will retain the roads for future access through this land to the national forest.

A more recent development that could affect the land status of Kuiu Island (and thus the land management) is that the South Kuiu Kwaan (tribe) has made claim to the Bureau of Land Management (BLM) for the south one-half of Kuiu Island based on aboriginal rights. The BLM has not awarded them any standing or rights.

The Kuiu and Tebenkof Bay Wilderness preclude development on South half of west Kuiu. Conclusion, Sumner, and the strait islands off-shore of East Kuiu are LUD II management areas.

Mining activities are minimal to nonexistent on Kuiu Island. No conflicts with mining are anticipated.

Facilities

This section describes the existing facilities within the study area, including transportation facilities, log transfer facilities, a logging camp, and an administrative site.

Transportation

In June of 1971, Alaska Lumber and Pulp Co., Inc. (now Alaska Pulp Corp.) and the Regional Forester made the decision to defer logging on west Chichagof and Yakobi Islands. They then selected Kuiu Island as a timber harvest area under the contingency provisions in the long-term contract. At this time the only road development on Kuiu Island was a small

network of temporary roads at Saginaw Bay. These roads were constructed in conjunction with independent timber sales. Rowan Bay was selected as the site for the new logging camp and log transfer facility.

The State of Alaska's long range transportation development planning in the early 1970s included Kuiu Island as a link in the island hopping Juneau to Ketchikan highway. This included a connection from Kuiu Island to the village of Kake on Kupreanof Island by bridging Rocky Pass near Summit Island. Kuiu Island is not currently approachable by any public transportation facilities (State Highways, ferry docks, or airports) and current development plans from the Alaska Department of Transportation and Public Facilities do not include any such facilities within the foreseeable future.

Currently there are about 190 miles of forest development roads in the analysis area (Table 3-2). The roads are part of an interconnecting system linked to the Rowan Bay and Saginaw Bay log transfer facilities (LTFs). Most of the road miles connect drainages of Rowan Bay, Security Bay, Saginaw Bay, and Kadake Creek. One stretch of road extends past the heads of the Bay of Pillars and Port Camden and skirts along the north and south shores of Three Mile Arm.

Table 3-2

Miles of Existing Forest Development Roads

VCU	Road Miles
398	3
399	30
400	28
402	44
403	7
405.1	0
416	0
417	0
418	0
419	19
420	14
421	45
Total Miles	190

Source: Aiken, 1992

Log Transfer Facilities

There are two existing Log Transfer Facilities (LTFs) and one planned LTF in the Kuiu Analysis Area. The Rowan Bay LTF was originally designed and constructed as a bulkhead for single "A-frame" operations. The facility was reconstructed in 1988 as a low-angle slide.

The Saginaw Bay LTF was originally a bundle skid facility and was reconstructed as a bulkhead in 1986. A low-angle slide LTF in No Name Bay was proposed to be constructed in conjunction with the 1981-86 and 1986-90 APC Operating Period (See Appendix D.)

Table 3-3

Log Transfer Facility Status

LTF Site	VCU	Status	Year Constructed or Planned	Camp	Timber Volume Hauled (MMBF)
Rowan Bay	402	Existing	1974	Yes	478
Saginaw Bay	399	Existing (Not Currently used)	1964	No	174
No Name Bay	417	Planned	1993/94	Planned	0

Source: Aiken, 1992

Logging Camps

The camp at Rowan Bay is the only active logging camp on Kuiu Island. It has been in use since 1974. As of September, 1988, the camp had 36 permanent residents; 40-50 bunkhouse employees; 38 children of which 23 are school age; two full time school teachers and eight teacher's aides; and seven tree thinning contractors with their families. Infrastructure included 32 mobile homes; six bunkhouses with a 100-person capacity; two permanent maintenance shops; a cook house with 40-person capacity; a business office; laundry facility; and a public school. Population fluctuates, but the size of the camp has not changed significantly in the last three years.

The Rowan Bay logging camp is served primarily by vendors and businesses from four southeast Alaska communities. Goods and services are provided by 18 Sitka businesses; six Petersburg businesses; seven Wrangell businesses; and 16 companies from Ketchikan.

Saginaw Bay originally had a logging camp associated with it but the camp was disassembled and no plans exist for its reconstruction.



Rowan Bay Logging Camp

Administrative Sites

The only existing Forest Service administrative site on Kuiu Island is located at the Rowan Bay Logging Camp. The administrative site consists of six trailer houses for crew quarters, a cook house, and warehouse. This site can accommodate approximately 30 forest workers.

Cultural Resources



Affected Environment

The Cultural Resource Overview of the Tongass National Forest (Arndt et al 1987) describes the diversity of cultural resource sites that are or have the potential of being discovered in southeast Alaska. The overview presents the basic cultural and physical contexts and themes within which the significance of specific sites can be evaluated by the Forest Service. It provides background information, identifies gaps in the present understanding of the cultural use of southeast Alaska, and serves as an interpretive document for sensitizing both the general public and Forest Service personnel to the significance and fragile nature of cultural sites.

Cultural resources include the evidence of past human activity, potentially dating from the first occupation of southeast Alaska to the recent past. Information on the prehistory of the region is limited, and Kuiu Island is poorly known. Some sites in the region, including the Ground Hog Bay 2 site on the Chilkat Peninsula and the Hidden Falls site on Baranof Island, indicate that the first occupation of southeast Alaska dates to nearly 10,000 years ago. Excavations conducted in Tebenkof Bay on western Kuiu Island reveal a cultural sequence spanning the last 4,500 years.

At the time of Euro-American contact, the Kake, Kuiu, Henya and Klawock Tlingit used or controlled various portions of Kuiu Island. The Kake Tlingit appeared to control the northern half of Kuiu Island, including Security Bay, Saginaw Bay and Port Camden. Villages and subsistence sites for seasonal hunting, fishing and collecting activities were located throughout the area. Kuiu Island historical activities, generally defined as those occurring at least 50 years ago and after Euro-American contact, include commercial fish processing, fur farming, logging and animal trapping.

Reconnaissance and complete level cultural resource surveys have been completed of various Forest Service activities on Kuiu Island. Detailed information about project surveys and known sites is contained in files at the Stikine Area Supervisors Office. These records are, however, generally not available to the public because of the sensitivity of cultural resource sites.

The types and frequency of known and suspected cultural resource sites within the Kuiu Island study area are presented in Table 3-4. A total of 53 sites (historic and aboriginal) are on the Alaska Heritage Resource Survey, a statewide listing of recorded cultural resources. None of these sites are listed in the National Register of Historic Places. Most of the sites are eligible for inclusion in the National Register of Historic Places, but very few have been formally evaluated for eligibility. An additional 91 locations are suspected cultural sites, which have not been field verified, or former special use permit sites which may be historic. In addition there are 22 locations applied for as Native allotments, which may represent former sites.

Table 3-4

Cultural Resource Sites

VCU	S.U.P. ¹	N.A. ²	S.S. ³	H.S. ⁴	14(h)(1) ⁵	A.S. ⁶	Total
398	13	2	2	0	2	3	22
399	10	4	5	2	2	8	31
400	24	1	4	0	2	0	31
402	0	0	3	1	0	11	15
416	4	0	2	3	0	1	10
417	4	0	3	3	0	2	12
418	2	0	3	2	0	0	7
419	2	0	4	0	0	2	8
420	0	11	5	1	0	7	24
421	0	4	1	0	0	1	6
Total	59	22	32	12	6	35	166

Source: McCallum, 1992

¹ S.U.P. = Special Use Permit Sites

² N.A. = Native Allotments

³ S.S. = Suspected Sites

⁴ H.S. = Historic Sites listed on the Alaska Heritage Resource Survey

⁵ 14(h)(1) = Historic and Cemetery Sites Conveyed Under 14(h)(1) of the Alaska Native Claims Settlement Act

⁶ A.S. = Aboriginal Sites listed on the Alaska Heritage Resource Survey

Aboriginal sites include villages, middens, temporary camps, fish weirs, fish traps, cemeteries, forts or defensive sites, culturally modified trees, petroglyphs, pictographs and garden sites. Historic period sites include cabins, camps, fur farms, canneries and salteries. Native allotments include those parcels of land applied for by Native Alaskans. Special use permits include those areas that were granted Forest Service permits prior to 1942, but have not been verified on the ground as historic sites. Suspected sites are those that are reported in the literature or have been observed by non-professionals, but which have not been field verified.



Historical Site. Fox farm located near Tebenkof Bay.

Prior to the field survey conducted for this study, a total of 49 cultural resource surveys had been conducted in the study area at various levels of intensity (see Table 3-5). These range from reconnaissance surveys, where areas of expected sites are examined, to complete surveys which are designed to identify all cultural resources within a given area. The vast majority of these surveys have been conducted by archaeologists examining various Forest Service projects. Forest Service archaeologists have surveyed over 103 miles of coastline and 2,183 acres within the study area.

Sealaska Corporation contracted for an archaeological and historical inventory of the region to identify historic and cemetery sites for selection under 14 (h)(1) of the Alaska Native Claims Settlement Act (ANCSA) (Sealaska Corporation 1975). Sealaska selected several village and cemetery sites on Kuiu Island. A total of six 14 (h)(1) sites have been interim conveyed or conveyed to Sealaska Corporation within the study area.

Table 3-5

Cultural Resource Surveys in the Kuiau Island Study Area

VCU	Miles of Surveyed Coastline	Acres	Survey Type	By Whom	Date
398	0.37	N/A	Reconnaissance	Reger	1974
Total		N/A			
399	2.41	N/A	Reconnaissance	Reger	1974
		20.0	Reconnaissance	Roberts	1985
		11.5	Reconnaissance	Roberts	1988
Total		31.5			
400	0	90.0	Complete	McCallum	1990
Total		90.0			
402	6.98	N/A	Reconnaissance	Reger	1974
		24.0	Reconnaissance	Arndt	1979
		60.0	Reconnaissance	Roberts	1988
		7.3	Complete	McCallum	1989
		155.0	Complete	McCallum	1990
Total		246.3			
405.1	0	0	None		
Total		0			
416	22.0	N/A	Reconnaissance	Brooks	1976
		32	Reconnaissance	Plaskett	1977
		105	Reconnaissance	Arndt	1978
Total		137			
417	20.0	N/A	Reconnaissance	Brooks	1976
		N/A	Reconnaissance	Brooks	1976
		24.0	Reconnaissance	Plaskett	1977
		216.0	Reconnaissance	Arndt	1978
		5.0	Reconnaissance	Roberts	1983
		1.0	Reconnaissance	Roberts	1984
		0.5	Reconnaissance	Roberts	1987
		9.0	Complete	Roberts	1982
		40.0	Complete	Roberts	1985
		6.0	Complete	Roberts	1986
Total		301.5			
418	11.0	12.0	Reconnaissance	Plaskett	1977
		116.0	Reconnaissance	Arndt	1979
Total		128.0			
419	17.61	N/A	Reconnaissance	Brooks	1976
		8.0	Reconnaissance	Plaskett	1977



Table 3-5

Cultural Resource Surveys in the Kuiu Island Study Area

VCU	Miles of Surveyed Coastline	Acres	Survey Type	By Whom	Date
419 (cont.)		208.0	Reconnaissance	Arndt	1978
		132.0	Reconnaissance	Arndt	1979
		16.0	Complete	McCallum	1990
		10.0	Complete	McCallum	1991
		80.0	Complete	Hardin	1991
Total		454.0			
420	23.0	N/A	Reconnaissance	Reger	1974
		6.0	Reconnaissance	Plaskett	1977
		82.0	Reconnaissance	Arndt	1979
		16.0	Reconnaissance	Arndt	1979
		12.0	Reconnaissance	Arndt	1979
		284.0	Reconnaissance	Arndt	1979
		0.5	Reconnaissance	Roberts	1985
		53.0	Complete	Roberts	1988
		60.0	Complete	McCallum	1989
		72.0	Complete	McCallum	1991
		18.0	Complete	Kauneckis	1991
		27.0	Complete	Kauneckis	1991
		3.0	Complete	Kauneckis	1992
		7.0	Complete	Kauneckis	1992
Total		640.5			
421	0.37	N/A	Reconnaissance	Reger	1974
		39.0	Complete	Hardin	1991
		116.0	Complete	Kauneckis	1992
Total		155.0			
Totals	103.74	2183.8	31 Reconnaissance 18 Complete		

Source: McCallum, 1992

N/A: Data not available

Environmental Effects

Cultural resources within the study area may contain significant information on past environmental conditions and human lifeways, possibly including information related to past conditions along the north Pacific Rim. These resources are both fragile and non-renewable. Primary impacts can include alteration to the settings of sites; alteration of above ground objects, features and structures; as well as the spatial relationships among them; and disturbance or destruction of subsurface cultural deposits. Secondary impacts may include a higher frequency of site vandalism due to increased access from constructed roads.



Federal laws and regulations (including the National Historic Preservation Act of 1966, as amended; the Archaeological Resources Protection Act of 1979, as amended; and the American Indian Religious Freedom Act of 1978) require a process for considering the impacts of Federal projects on cultural resources. In brief, this process, outlined in Section 106 of the National Historic Preservation Act, involves identifying cultural resources, determining which are significant or eligible to the National Register of Historic Places, evaluating effects to significant sites, and designing and implementing measures to negate any adverse effects. The process is undertaken in consultation with the Alaska State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation where adverse effects are found.

The known and reported cultural resource sites in the study area are surrounded by protective buffers and will not be affected. It is more difficult, however, to predict the effects on sites that have not yet been identified. It is well documented that sea levels in the islands of southeast Alaska fluctuated throughout time. It is also apparent that the seashore and coastal environment was the focus of most activities of the people who have inhabited the area. Therefore it appears as though past sea levels play an indicator role in locating most cultural resources and the key criterion for establishing probability zones is elevation above the present coastline. Implementation of a 500-foot beach fringe buffer zone effectively minimizes the probability of impacting cultural resources eligible for inclusion in the National Register of Historic Places.

The current forest-wide probability model for cultural resources considers slope angle and elevation as the two primary environmental factors for establishing a high, medium or low probability for discovery of cultural resources. The elevation and slope angle figures used to delimit the probability zones are general guidelines. The high probability zone is defined as all areas between mean high tide and 100 feet in elevation. The medium probability zone is defined as all areas between 100 and 1,000 feet in elevation, with slope angles of 30 percent or less. The low probability zone is defined as all areas between 100 and 1,000 feet with slope angles greater than 30 percent; all areas above 1,000 feet, regardless of slope angle; and muskeg areas. Normally, areas of high and medium probability will require a field survey to identify significant sites, but it may be possible to recommend clearance on the basis of the results of a literature and files search.

As a result of examining previous cultural resource surveys a revised probability model was implemented in the Supplemental Environmental Impact Statement (SEIS) for the 1981-86



and 1986-90 Alaska Pulp Corporation operating periods on Kuiu Island. In that model the high probability zone is defined as all areas between mean high tide and 100 feet in elevation. The medium probability zone is defined as all areas between 100 and 300 feet in elevation, with slope angles less than 30 percent. The low probability zone is defined as all areas between 100 and 300 feet with slope angles greater than 30 percent and all areas above 300 feet. Also, any area falling in the medium or low probability zone will be considered high probability if it is where: 1) culturally modified trees are reported or suspected, 2) raised marine fossil beaches are reported or suspected, or 3) historic mining or prospecting activity has been identified through literature review. As a result of this model all areas in the high and medium probability zone and 5.5 percent of areas in the low probability zone are targeted for field survey.

Implementation of this probability model on Kuiu Island over the last two years suggests a need for further revision. As of November, 1992, 25 timber harvest units, totalling 1,049 acres, and 12.95 miles of associated road have been field surveyed using the model proposed in the 1981-86 and 1986-90 SEIS. No cultural resources have been identified in any of the surveyed areas. Recent examination of past survey records on the Tongass National Forest indicates that over 28,000 acres have been surveyed at elevations above 100 feet resulting in the identification of only nine sites. This compares to 523 sites recorded below 100 feet during surveys of almost 14,000 acres. This data suggests the potential for cultural resources above 100 feet in elevation is extremely low throughout southeast Alaska. Examination of recorded cultural resources on Kuiu Island indicates that none are located at elevations above 50 feet.

The probability model for the current study is revised based on a review of previous surveys and known cultural resources. The high probability zone is defined as all areas between mean high tide and 100 feet in elevation. In addition to this, the high probability zone includes a zone around all streams and lakes that have historically contained anadromous fish; mineralized zones exhibiting historic mining activities; geologic features such as karst areas, littoral caves and areas of volcanic sediments likely to contain bluff shelters; areas of traditional ethnohistoric subsistence use; and aboriginal myth and legend sites. The former medium and low probability zones have been compressed to create a low probability zone which consists of all areas above 100 feet in elevation, not included within the high probability zone.

This probability model has been applied to each alternative to gauge the potential effect to cultural resources. Generally, those alternatives which favor more development pose a greater threat to undiscovered cultural resources. Implementation of a 500-foot beach fringe buffer zone for all alternatives and a 1,000-foot estuary buffer zone for most alternatives has effectively eliminated the areas of highest potential for cultural resources. An examination of ground disturbing activities in relation to the cultural resource probability model indicates that Alternative 3 offers the greatest chance of creating ground disturbance and potentially damaging undiscovered cultural resources, followed in descending order by Alternative 4 and Alternative 2. The "no action" alternative by its very nature would constitute the least threat to cultural resources.

The Stikine Area targeted 25 timber harvest units, 5.5 miles of road and the log transfer facility at No Name Bay for field survey within the cultural resource high probability zone. The

remaining development is located within the low probability zone and no field survey is warranted. A total of 22 timber harvest units and 5.5 miles of road were surveyed during the 1992 field season. A total of three units were inaccessible during the field survey and three units have been dropped from consideration since issuance of the draft environmental impact statement.



Stikine archaeologists surveyed targeted areas between May 17 and September 9, 1992 and discovered a total of 395 culturally modified trees. No other cultural resources were discovered in the surveyed areas. Table 3-6 presents a summary of surveyed areas and results. The recorded culturally modified trees are widely scattered and are not eligible for inclusion in the National Register of Historic Places. The vast majority of recorded culturally modified trees are triangular bark-stripped Alaska cedar found on ridges and other well-drained areas. The fact that they are scattered and lack associated sites or artifacts suggests they are not significant.

The Stikine Area has prepared a report for the Alaska State Historic Preservation Officer presenting the cultural resource probability model, an extensive literature and files search and the results of the field survey. Cultural resource clearance is recommended with two stipulations which will be implemented. The first stipulation is that field survey be completed on three timber harvest units (402-34, 402-35 and 402-37; total = 91 acres) which were inaccessible, prior to their release to the Alaska Pulp Corporation. These remaining targeted units appear to have a potential for additional culturally modified trees, but the potential for other types of sites is extremely low. The second stipulation is that post-construction monitoring be conducted of all areas of ground exposure along the proposed road system, regardless of placement within the cultural resource probability model. This form of monitoring will serve to validate the assumptions of the cultural resource probability model as to the spatial distribution of cultural resources and to determine the effectiveness of site discovery techniques used during the field survey. The Alaska State Historic Preservation Officer concurred with clearance recommendations and the two stipulations in a letter dated November 30, 1992.



Table 3-6

Cultural Resource Survey Areas and Results

VCU	Unit Number	Acres	Road Miles	Results
399	399-19h	51.6		No cultural resources
400	400-8	56		No cultural resources
402	402-28	8		109 culturally modified trees
	402-29h	23		140 culturally modified trees
	402-30	31		No cultural resources
	402-36	41		No cultural resources
	402-41	50		No cultural resources
	402-45	39		No cultural resources
	402-46	31		No cultural resources
	402-48	29		27 culturally modified trees
			2	12 culturally modified trees
Total		252	2	288 culturally modified trees
416	416-15 ¹	30		No cultural resources
			1.5	No cultural resources
Total		30	1.5	No cultural resources
417	417-2	74		7 culturally modified trees
	417-6	63		20 culturally modified trees
	417-8	26		No cultural resources
	417-9 ¹	44		No cultural resources
	417-13	54		No cultural resources
	417-18	72		No cultural resources
	417-23 ¹	11		No cultural resources
			2	60 culturally modified trees
Total		344	2	87 culturally modified trees
418	418-1	34		No cultural resources
	418-5	23		No cultural resources
	418-6	85		20 culturally modified trees
	418-16	34		No cultural resources
Total		176		20 culturally modified trees
TOTAL		909.6	5.5	395 culturally modified trees

Source: McCallum Report, 1992

¹ Units dropped from consideration since publication of the DEIS

Cumulative Effects

Impacts from decay, natural landscape changes and development pose a threat to the preservation of significant cultural resources in the study area. Future timber harvest combined with other ground disturbing activities could result in a loss of cultural resources. Increased access to cultural resource sites also poses a potential threat from vandalism and looting. Known cultural resource sites will be periodically monitored to determine if any natural or human-caused impacts are occurring. Previous cultural resource inventories indicate most if not all of the cultural resources are located within a short distance of the present coastline. It is impossible, however, to determine the exact number and nature of cultural resources that are threatened by future development. Maintenance of a 500-foot beach fringe and a 1,000-foot estuary protective buffer zone for future development will effectively lessen the potential impact to cultural resources. Implementation of field inventories and various mitigation measures will reduce the potential loss by preserving significant sites and by providing data on those that cannot be preserved.



No cultural resources eligible to the National Register of Historic Places have been identified during previous cultural resource surveys of timber harvest units and associated development. Validation monitoring has confirmed assumptions about the cultural resource sites. No sites, other than scattered culturally modified trees, have been located at elevations above 50 feet.

Economics



Affected Environment

Fishing and fish processing, the wood products industry, and the recreation/tourism industry generate most of the private sector economic activity in southeast Alaska. These industries provide a significant number of jobs (direct employment). Money spent by employees of these industries, and money these industries spend with other industries create additional jobs (indirect and induced employment). Any change in the economic activity in one of these primary industries will have an impact throughout the economy. (For more information on these industries see the discussion of the Socio-Economic Setting earlier in this chapter.)

There are two significant economic questions related to this project. The first is "How will this project contribute to the overall economic well-being of southeast Alaska?". This is generally referred to as economic impact analysis. The second question is "How can the project be designed to maximize net economic worth to the public?". This is referred to as economic efficiency analysis.

Economic Impacts

Timber harvest in southeast Alaska dates back to the early 1900's, and the woods products industry is well-integrated into the economies and lifestyles of many communities. Over the years, the timber industry has survived the challenges of a cyclical market, expanded international exports to thirty nations, and employed technological advances to maintain market share despite increased competition.

Timber harvest on the Tongass National Forest reached a decade high of 471 million board feet in fiscal year 1990. Of this total, 48 percent was used in the production of lumber and cants, 39 percent in pulp production, and the remaining 13 percent consisted of cedar round log exports. Stumpage prices for Tongass timber sales also hit a record high of \$120.90 per thousand board feet. As the supply of timber from private lands decreases, National Forest timber will become increasingly important to the Alaskan timber industry. (A complete discussion of the timbers supply and demand situation is available in "Timber Supply and Demand" USDA Forest Service, 1990.)

Employment

Timber related employment in southeast Alaska has averaged 4,727 jobs from 1981 to 1990, reaching a high of 6,113 in 1990 (Analysis of the Management Situation, USDA Forest Service, 1990). This includes direct, as well as indirect and induced employment. (Indirect and induced employment is employment in sectors other than the woods products sectors that result from activity in the wood products sectors.)

Timber from private lands is not required to be processed domestically and so much of the timber harvested from private lands moves directly into the export market for softwood logs. As a result, more timber related jobs in southeast Alaska are related to timber harvested from national forest lands. It is estimated that private timber harvest generates an average of 3.5 jobs for each million board feet harvested, while timber harvested from the Tongass National Forest lands generates 8.7 jobs for every million board feet of timber harvested. Of these 8.7 jobs, 4.7 are direct employment in the wood products sectors and 4 jobs are indirect and induced jobs from other sectors). (Timber Supply and Demand, USDA Forest Service, 1990)



The pulp mills in Sitka and Ketchikan are the largest employers in those communities. The nature of pulp production is such that production levels cannot be adjusted incrementally; the plants must be run continuously or shut down. The shutdown of either pulp mill would have significant impact upon the communities in which they are located. (Timber Supply and Demand, USDA Forest Service, 1990.)

Income

Based on an estimated value of \$33,300 per job (Analysis of the Management Situation, Tongass Land Management Plan, Forest Service, 1990) the income produced by jobs resulting from timber harvest on the Tongass National Forest was \$203,562,900 in 1990 and averaged \$157,409,100 between 1981 and 1990. (Timber Supply and Demand Study, USDA Forest Service, 1990)

Efficiency Analysis

The Timber Sale Program Information Reporting System (TSPIRS) was designed to evaluate the financial and economic performance of timber sale programs on individual national forests. Congress directed the Forest Service to develop a timber sale cost accounting system in response to public concerns about below cost timber sales. (Below cost sales are sales where costs to harvest timber exceed revenues.) This request was in response to concerns about the efficiency of National Forest timber sale programs. The TSPIRS program was designed cooperatively by the Forest Service and the General Accounting Office (GAO).

Table 3-7 summarizes the financial results of the Tongass National Forest timber sale program according to TSPIRS. The financial accounting matches timber related costs against timber related revenues received on the Tongass N.F. in 1989 and 1990.



Table 3-7

Revenues and Expenses**Tongass National Forest Timber Sale Program**

	FY 1989	FY 1990
Revenue		
Timber Sales	3,573,281	16,100,341
Purchaser Road Credit	17,194,336	20,175,165
Associated Charges	270,954	236,225
Interest and Penalties	72,885	113,242
Total Revenues	\$21,111,456	\$36,624,973
Expenses		
Sale Administration	3,192,144	5,081,695
Sale Activity Allowance	4,916	9,014,615
Growth Activity Allowance	3,044,602	5,321,195
Facilities Depreciation	538,974	538,974
General Administration	3,200,577	4,964,118
Total Operating Expense	\$14,893,123	\$24,920,080
Gain or Loss Before Payment to State	\$6,218,332	\$11,709,892
Payment to State	\$4,989,178	\$8,888,674
Net Gain or Loss from Timber Sales	\$1,229,154	\$2,821,218
Volume Harvested (MBF)	444,606	471,634

Source: "Timber Supply and Demand Study" USDA Forest Service, 1990

Since a financial accounting only considers revenues and expenses from a single year, it does not, by itself, accurately describe the performance of a program like a timber sale program where not all cost and benefits occur in the same year or can be measured through financial transactions.

The TSPIRS economic report summarized in Table 3-8, displays the net present value of the acres affected by timber harvest in fiscal 1990. "Net" means considering both positive and negative. "Present" means that costs and values are discounted to a consistent point in time (1990 in this case) so that values from different years can be compared on an equal basis. "Value" refers to both cash and non-cash costs and benefits. (An example of a non-cash cost or benefit might include the value of increased or decreased fish or wildlife outputs that are a result of the timber harvest.)

Table 3-8

**Present Value of Costs and Benefits
Tongass National Forest Timber Sale Program**

	FY 1989	FY 1990
Present Value of Benefits		
Timber	\$38,213,887	\$30,974,287
Recreation	\$94,838	\$0
Wildlife	\$456,453	\$37,578
Fisheries	\$2,100,866	\$2,086,563
Total Present Benefits	\$40,866,044	\$32,300,837
Negative Effects		
Wildlife	\$790,356	\$797,591
Present Value of Costs		
Timber	\$19,745,018	\$14,669,159
Roads	\$16,628	\$26,121,372
Recreation	\$10,405	\$0
Wildlife	\$2,003	\$0
Fisheries	\$659,387	\$911,533
Total Investments	\$20,433,411	\$41,702,064
Present Net Value	\$10,230,862	\$20,433,441
Source: "Timber Supply and Demand Study" USDA Forest Service, 1991		

Based on these generally accepted accounting principles for government accounting, as established by the GAO, the Tongass National Forest Timber Sale program has produced more value than costs in both economic and financial terms.

Environmental Effects

The following analysis compares the economic efficiency and economic impacts of each of the alternatives. The cumulative economic effects are also compared.

Economic Impacts

Employment



The most meaningful comparison is between Alternative 1, the No Action Alternative, and the other three action alternatives. All three action alternatives produce nearly the same level of employment. Since the production rate of the Rowan Bay operation is more likely influenced by market factors, rather than by a particular alternative, the actual jobs resulting from any of the action alternatives is not likely to vary by much. For sake of comparison, the volume available for harvest, if spread over a three year period, would produce the levels of employment displayed in Table 3-9 for each of three years.

Table 3-9

Employment Impacts (# of Jobs)

	Alt 1	Alt 2	Alt 3	Alt 4
Direct	0	160	182	185
Indirect and Induced	0	136	155	157
Total Employment	0	296	237	342

Source: Condon, 1992

Income

Assuming an annual income of \$33,300 per job, the alternatives would produce the income levels shown in Table 3-10 in each of the estimated three years necessary to complete the harvest.

Table 3-10

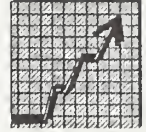
Income Produced by Alternative

	Income (in millions of dollars)
Alt 1	\$ 0.0
Alt 2	\$ 9.856
Alt 3	\$10.989
Alt 4	\$11.389

Source: Condon, 1991

Commercial Fishing Industry

Potential impacts on marine and fish resources are minimal. (See discussion in the *Fisheries* and *Marine Environment* sections in this chapter.) Streamside buffers and best management practices will protect fish habitat. As a result, none of the activities will have any measurable effect on commercial or sport fisheries.



The development of a log-transfer facility at No-Name Bay could impact some crab habitat and displace some commercial fishing activity. (No Name Bay is an important anchorage, especially in very cold winters when it stays ice-free while other anchorages in the vicinity may freeze.) Neither of these impacts is likely to have an effect on the amount of economic activity.

Recreation and Tourism Industry

Future employment in the recreation and tourism industries will change at the same rate as future use. The use is expected to increase 27 percent for recreation and tourism, 36 percent for sport fishing, and 53 percent for hunting during the 1990s (Forest Service 1990). Employment related to these activities will increase at similar levels. These increases in use and employment are not caused by, or related to, the proposed action in the North and East Kuiu Project Area.

Guided black bear hunting and guided kayaking are the primary commercial recreation activities in the Project Area. In 1992, there were 24 permits issued for commercial outfitters on Kuiu Island. Recent trends indicate slow but steady growth in commercial recreation use. (See the *Recreation* section in this Chapter.)

Kayaking is mostly in the Rocky Pass/East Kuiu area and the Tebenkof Bay/Bay of Pillars area. The proposed action will not affect Rocky Pass, Tebenkof Bay, or Bay of Pillars. However, No Name Bay and Seclusion Harbor on east Kuiu are two areas that could be affected. Logging and related developments may make these areas less attractive to kayakers and could displace some activity in this area.

Black bears are prevalent and commercial guided hunting occurs throughout the island. Black bears are opportunistic feeders and appear to do quite well on both the developed and undeveloped areas of Kuiu Island. It is unlikely that the proposed action will change the amount of guided hunts on Kuiu Island.

Timber Sale Economics

The Forest Service Timber Sale Preparation Handbook requires an economic efficiency analysis to compare benefits and costs of a project. The Handbook direction seeks to ensure that projects have at least a 60 percent of normal profit margin during a normal market (mid-market) condition. This economic efficiency analysis compares expected gross revenues at mid-market to estimated costs so net revenues can be determined.

Mid-market values and stump to truck logging costs vary by volume class. The variations are the result of stand characteristics that vary by volume class (eg. number of logs/MBF, de-

fect, grade, and species mix). Logging costs are generally lower in higher volume class stands because fewer but larger logs require less time to deliver to the mill. Pond-log value is the value of the logs as they arrive at the mill; the end product selling value minus manufacturing costs.



All costs required to deliver logs from the stump to the mill have to be considered when determining timber sale economics. These costs include activities associated with stump to truck logging, specified road construction and reconstruction, temporary road construction, log transfer facility construction, camp development, camp mobilization, and log transportation from the landing to the manufacturing sites (truck hauling, dump and raft, and water tow).

The estimated net timber value is determined by subtracting logging costs from the mid-market pond log values of timber in harvest units of each alternative. Individual units may not be economical to harvest alone, but they are economical when included with other units in the alternative. The result is less productive sites or stands with defective trees can be placed under intensive management as productive commercial forest land.

Table 3-11 summarizes timber values and costs to a timber operator of average efficiency, and net stumpage to the government, at the mid-market level for each alternative considered. Before timber is released to APC for logging, a timber cruise and appraisal will be completed. Alternative 4 has a slightly better net value than Alternative 2. Alternative 3 has the least net value of the action alternatives.



Table 3-11

Timber Cost and Value Summary

	Alt 2	Alt 3	Alt 4
Volume (MMBF Sawlog)	102	116	118
Selling Value (\$/MBF)	\$ 337.80	\$ 340.07	\$ 338.99
Costs (\$/MBF)			
Stump to Truck	\$ 102.84	\$ 103.17	\$ 95.85
Transportation	\$ 56.49	\$ 60.13	\$ 47.36
Temporary Roads	\$ 16.39	\$ 21.0	\$ 18.27
Other Temp Develop.	\$.50	\$.90	\$ 0.88
Specified Roads	\$ 66.46	\$ 100.08	\$ 70.21
Profit and Risk	\$ 44.88	\$ 45.75	\$ 47.49
Net Stumpage Value	\$ 50.24	\$ 9.04	\$ 58.93

Source: Gerdes, 1991

Table 3-11 shows that Alternative 4 has the highest mid-market stumpage value. This is due primarily to the lower transportation costs associated with this alternative. Alternative 3 has the highest selling value at the mid-market because of the higher average volume per acre for the harvest units.

Cumulative Effects

The cumulative effects of each alternative on the economic environment are difficult to estimate. There are a variety of factors affecting the employment, income and community stability of southeast Alaska. There are two aspects of a long-term timber harvest in the APC contract area that need to be addressed.

The first aspect is the economic and social benefit of continuing to meet the contractual requirements of the APC Long-Term Timber Sale Contract. From the standpoint of employment, personal income, population, and community stability, there is real benefit from maintaining a stable operation for APC. The receipts generated, including revenue to the U.S. Treasury, payments to the State of Alaska, state and local taxes, and dollars brought into the community, all represent an economic benefit. TLMP allocates most of the project area for timber production to meet the contractual obligations from the APC Long-Term Contract. Accordingly, the North and East Kuiu project plays a role in providing these benefits.



The second aspect of a long-term timber harvest program is the alteration of the natural environment from road building and timber harvest. Some of the economic and social value of southeast Alaska is dependent on its natural setting. The recreation and tourism industry relies on the natural conditions, abundant fish and wildlife, and visual resources. As more acres of National Forest and other land are converted from a natural condition to a managed forest, the industries dependent on the natural condition of the landscape will be adversely affected.

The balance of developed and natural landscapes necessary to sustain the social and economic environment must be set at the forest plan level, not the project planning level. It is the forest plan that sets the overall program level. The cumulative effects of different program levels are considered as part of that decision. The project level plan, of which this North and East Kuiu Project is an example, address where and how the program decided upon in the forest plan should be carried out. The overall magnitude of the program is much more significant than where and how the project is implemented in determining the cumulative impact on the economy.

Fisheries

Affected Environment



The fishing industry provides a major source of income for southeast Alaska. Fishing, especially for salmon, is also a source of subsistence for residents near Kuiu Island. Abundant streams and lakes in the area provide spawning and rearing habitats for pink, chum, coho, and sockeye salmon. Steelhead trout, Dolly Varden char, and cutthroat trout occur in streams on Kuiu Island and contribute to a small sport fishery. The maintenance of a strong and productive fishery is important to the area's economy. Sustaining the production of salmon for commercial, subsistence, and sport harvest is partially dependent upon habitat protection and is a prominent objective behind the Forest Service's Standards and Guidelines and the Tongass Timber Reform Act that are applied to timber harvest activities and road construction. This section identifies the salmon production potential and aquatic habitat in the study area.

Management Indicator Species (MIS)

Coho and pink salmon have been selected as MIS for anadromous species and Dolly Varden trout has been selected to represent resident species.

Pink (humpback) and coho (silver) salmon were selected to represent two different phases of salmon life history: spawning/egg incubation and freshwater rearing. Pink salmon, the most widely distributed of the salmon, spawn in fresh water from July through September. Immediately upon emergence from the gravels, juveniles go to sea where they mature in 2 years. They are very important to the commercial fishery of southeast Alaska where they represent the greatest poundage harvested. Spawning gravel quantity and quality limits pink salmon freshwater habitat capability.

Coho salmon also spawn and incubate in fresh water, but after emergence from the gravels, juveniles rear in freshwater for 1 to 4 years. After attaining a size of about 4 to 6 inches, the juvenile coho migrate from freshwater to the ocean where they usually mature within 2 years, reaching 8 to 11 pounds. Coho are very important to the commercial troll fishery and marine sport fishery of the region. Typically, the period of freshwater habitation limits coho freshwater habitat capability.

Dolly Varden char were selected to represent fish habitats because of their wide distribution, availability of data on the species' habitat requirements, and distribution over the full spectrum of resident fish habitats. Dolly Varden are also present in their anadromous form on the area.

No fish species known to occur in the project area has been determined to be threatened, endangered, or sensitive.



Fish Production and Harvest

The average annual salmon production potential of streams from north and east Kuiu Island exceeds 3,000,000 pounds (see Table 3-12). Pink salmon contribute 72 percent of the production followed by chum salmon (20 percent) and coho salmon (8 percent). Most of the fish production potential comes from streams in VCUs 399 (Saginaw Creek), 400 (Security Creek), 402 (Rowan Creek and Browns Creek), 420 (Slippery Creek and Port Camden Creeks), and 421 (Kadake Creek). Kadake Creek is the largest system on Kuiu Island and is the largest producer of pink salmon.

Table 3-12

Average Annual Weight of Salmon Available for Commercial Harvest Based on the Fish Habitat Capability Model (thousands of pounds)

VCU	Pink	Chum	Coho	Total
398	18.6	1.9	15.6	36.1
399	316.4	32.4	31.8	380.6
400	396.5	429.2	62.7	888.4
401	25.4	2.6	1.2	29.2
402	309.4	31.7	58.4	399.5
416	118.8	12.2	3.9	134.9
417	36.2	3.7	8.0	47.9
418	108.4	11.1	7.3	126.8
419	180.0	18.4	8.5	206.9
420	315.3	105.7	25.8	446.8
421	693.8	71.0	44.2	809.0
Total	2518.8	719.9	267.4	3506.1
Percent	71.9	20.5	7.6	100.0

Source: Based on data from the TLMP Fish Capability Model (Kessler) and ADF&G data and assumes escapement goals have been met.

The estimate of the average annual weight of salmon available for commercial harvest was based on the TLMP Fish Habitat Capability Model (Kessler) and A.D.F. & G. catch and escapement data. The Fish Habitat Capability Model provides production estimates for pink and coho. Due to the lack of a capability model, the production of chum salmon was reached by using the relationship between the number of chum and pinks seen during escapement counts. Based on A.D.F. & G. escapement data between 1978-1992, the ratio of summer chum to pinks averaged .04:1 for north and east Kuiu and for Fall Dog Creek in Security Bay the ratio of fall chum to pinks was .70:1. For the Port Camden chum streams the ratio of chum salmon to pinks was 3.2:1. It was assumed that chum were harvested at the same ratio. A fry to adult survival coefficient of .02 was used for pinks and .08 was used for coho.

The harvest rate of pink salmon for the period 1976-1990 averaged 52 percent for northern southeast, 69 percent for southern southeast and 66 percent for all of southeast combined. Since north Kuiu is in district 109 which is in northern southeast, 52 percent was used as the

harvest rate for both pink and chum. A.D.F. & G. studies have shown that harvest rates of wild coho salmon can vary widely throughout southeast Alaska. Shaul, (ADF&G Report #162, 1986) reported harvest rates of between 37.5 percent and 87.8 percent. For this reason, a harvest rate of 60 percent was used for coho. Based on A.D.F. & G. salmon catch data between 1971-1985 for southeast Alaska the average weight of pink was 3.73 lbs, coho was 7.82 lbs and chum was 9.55 lbs.



To confirm the accuracy of the fish habitat capability model we looked at the escapement figures for the streams in subdistricts 109-44 (VCU 399) and 109-45 (VCU 400) between 1978-1992. A.D.F. & G. multiplies peak escapements by 2.5 to account for fish not seen or not present at the time of the peak count. The average peak escapement for VCU 399 was 33,494 pinks. When multiplied by 2.5 the actual escapement is 83,735 pinks. The habitat capability model predicts an escapement of 78,290 pinks based on a commercial catch rate of 52%. The average peak escapement of for VCU 400 was 28,911 pinks, multiplied by 2.5 to get an actual escapement of 72,277 pinks. The habitat capability model predicts an escapement of 98,115 pinks based on a commercial catch rate of 52 percent. Both VCU's combined have a capability of an escapement of 176,405 pinks compared to an observed and adjusted peak escapement of 156,012 pinks. Based on the analysis of these two VCU's, where comparable data is available, we believe the estimated number of salmon from the habitat capability model is reasonable for the remaining VCU's in our study area.

The two most used sport fishing streams are Kadake Creek and Rowan Creek. Steelhead and coho salmon are normally the species of interest for sport fishermen. Kadake Creek is one of only 19 "Gold Pin" watersheds in southeast Alaska designated by the ADF&G Sport Fish Division for its high quality sport fishing.

The important subsistence streams are Fall Dog Creek at the head of Security Bay and the two small streams near the head of Port Camden. Residents of Kake are the main users of the chum salmon returning to these streams.

A description of streams is facilitated by use of a three-level stream classification system, which is described in the Aquatic Habitat Management Handbook (Forest Service 1986a). Class I streams are defined as stream channels that are accessible to anadromous fish (pink, chum, sockeye, and coho salmon; steelhead, cutthroat trout, and dolly varden char which spawn in freshwater and complete most of their rearing in saltwater) or channels upstream of migration barriers that have reasonable enhancement opportunities for anadromous fish, or are high quality resident fish habitat. Class II streams are defined as channels that contain only resident fish populations (cutthroat trout and Dolly Varden char). These include streams that contain resident fish and are upstream of falls too high to ladder. Class III streams do not have fish populations but often have potential water quality influence on downstream aquatic habitats in Class I and Class II channels. Some steep gradient Class III streams run directly into saltwater and provide no habitat for fish.

The study area has 292 miles of usable stream habitat for salmon, trout, and char (Table 3-13). Class I and Class II streams account for 78 percent (228 miles) and 22 percent (64 miles), respectively, of the available fish habitat. This habitat is widely distributed over 70



streams; 6 streams have greater than 10 miles of habitat and 64 are smaller with less than 10 miles of habitat. These streams have been given a unique number by the Alaska Dept. of Fish and Game denoting them as salmon producers. Other very small streams have additionally been identified through the Forest Service channel classification process and during site visits as Class I and II. The alternative maps accompanying this document show the location of the larger Class I and II streams.

Table 3-13

Miles of Stream by Stream Class

VCU	Class I	Class II
398	5.0	3.0
399	23.9	2.8
400	29.0	4.9
401	1.7	0.0
402	35.2	17.4
416	14.1	11.6
417	8.3	4.7
418	11.8	2.3
419	13.8	9.7
420	27.1	4.8
421	58.4	2.9
Total	228.3	64.1

Source, Aho, 1991

Prior Timber Harvest

A number of the Class I and II streams have been affected by past timber harvest activities. Saginaw, Kadake, Browns, and Rowan Creeks have had the most harvest in the riparian zone. Between 2 and 58 acres of riparian habitat have been logged within 50 feet of the Class I reaches for the streams by VCU (Table 3-14). For this analysis, the riparian zone has been subdivided into the area from the stream bank to 50 feet from the stream and from 51 feet to 100 feet from the stream. The rationale for this division is the vegetation closer to the stream is more important for providing shade, bank stability, and logs into the stream for habitat diversity.

Class I Streams

The acres harvested in the 0 to 50 foot subdivision for Class I streams was only slightly less than what was harvested from 51 to 100 feet from the stream. For the entire study area, approximately 230 acres within 50 feet and 250 acres 51 to 100 feet have been logged (Table 3-14). This suggests that prior timber harvest occurred to the stream bank, or when buffers were used they were at least 100 feet wide.

Table 3-14

**Acres of Riparian Area with Prior Timber Harvest near
Class I Streams**

VCU	Distance From Stream Bank	
	0-50 ft	50-100 ft
398	Trace	Trace
399	74	76
400	17	21
401	0	0
402	53	57
416	7	6
417	2	2
418	5	6
419	19	19
420	12	12
421	41	51
Total	230	250

Source: Aho, 1991

To put the 230 and 250 acres harvested into perspective, the percent harvested of the total amount of riparian habitat for Class I streams was summarized by VCU (Table 3-15). For the harvest within 50 feet, the percentages range from a trace in VCU 398 to 20 percent for VCU 399. For most VCU's, the percentage is between 1 and 8 and is similar for both the 0 to 50 and 51 to 100 foot zones.



Table 3-15

Percent of Class I Riparian Area Harvested

VCU	Distance From Stream Bank	Acres Harvested	Total Acres	Percent Harvested
398	0-50	Trace	144	Trace
	50-100	Trace	149	Trace
399	0-50	74	378	20
	50-100	76	375	20
400	0-50	17	550	3
	50-100	21	549	4
402	0-50	53	691	8
	50-100	57	687	8
416	0-50	7	243	3
	50-100	6	245	2
417	0-50	2	148	1
	50-100	2	147	1
418	0-50	5	215	2
	50-100	6	232	3
419	0-50	19	254	7
	50-100	19	257	7
420	0-50	12	531	2
	50-100	12	506	2
421	0-50	41	836	5
	50-100	51	826	6

Source: Aho, 1991

Class II Streams

For Class II streams, sections of Saginaw and Kadake Creeks have had the most harvest in the riparian zone with 23 and 11 acres, respectively, in the 0 to 50 foot zones. A total of 86 acres of Class II riparian 0 to 50 feet and 103 acres from 51 to 100 feet of the channels has been cut (Table 3-16). The percent harvested by VCU ranges from 0 to 24 percent with the majority of the VCU's below 10 percent (Table 3-17). As with the Class I streams, there is very little difference between the 0 to 50 and 51 to 100 foot zones.

Table 3-16

**Acres of Riparian Area with Prior Timber Harvest near
Class II Streams**

VCU	Distance From Stream Bank	
	0-50 ft	50-100 ft
398	2	2
399	31	35
400	17	21
402	11	16
416	0	0
417	0	0
418	0	0
419	9	10
420	5	6
421	11	13
Total	86	103

Source: Aho, 1991



Electro-shocking stream to determine fish presence.



Table 3-17

Percent of Class II Riparian Area Harvested

VCU	Distance From Stream Bank	Acres Harvested	Total Acres	Percent Harvested
398	0-50	2	44	5
	50-100	2	45	4
399	0-50	31	141	22
	50-100	35	145	24
400	0-50	17	102	16
	50-100	21	107	20
402	0-50	11	145	8
	50-100	16	149	10
416	0-50	0	118	0
	50-100	0	121	0
417	0-50	0	77	0
	50-100	0	80	0
418	0-50	0	27	0
	50-100	0	28	0
419	0-50	9	250	3
	50-100	10	221	5
420	0-50	5	136	4
	50-100	6	140	4
421	0-50	11	111	10
	50-100	13	118	11

Source: Aho, 1991

Road Crossings

One-hundred-sixteen individual crossings have been constructed over Class I streams within the study area. Roads often cross Class II channels in these same watersheds (see Table 3-18).



Table 3-18

Number of Road Crossings on Class I and II Streams by VCU At Present

VCU	Class I Crossings	Class II Crossings	Total
398	2	0	2
399	16	7	23
400	13	3	16
401	0	0	0
402	35	6	41
416	0	0	0
417	0	0	0
418	0	0	0
419	9	1	10
420	3	6	9
421	38	8	46
Total	116	31	147

Source: Aho, 1991

Fish Habitat Enhancement

Fish habitat enhancement projects have been completed within the study area to increase the number of salmon produced. A fish ladder was constructed in 1983 to provide access for coho to the upper watershed of Dean Creek (VCU 400). The upstream habitat could produce approximately 3,000 coho to the commercial fishery, but actual production has been sharply lower. Survey of the upper Dean Creek watershed in the summer of 1991 indicated a good population of juvenile coho indicating this project is beginning to produce the number of fish originally estimated.



Road crossing designed to allow fish passage.

A fish ladder located on Slippery Creek (VCU 420) was constructed in 1988. At full production, the project will provide an estimated 11,000 coho and an unestimated number of chum salmon, pink salmon, and steelhead for harvest. The upper watershed has been stocked with hatchery produced coho fry. The system is already producing for the fisheries and is expected to be at capacity for coho within a few years. In addition to coho, many thousand adult pink salmon were spawning above the ladder in 1991.

Chum salmon egg incubation boxes have been installed by the Northern Southeast Regional Aquaculture Association, the Alaska Pulp Corporation, and the Forest Service in the two streams at the head of Port Camden (VCU 420). This project, constructed in phases from 1987 to 1990, has the capacity to produce 50,000 chum salmon for the commercial fishery. The boxes were filled with 5.4 million eggs in 1991, and it is expected the estimated production will soon be realized.

In 1988, 1989, and 1990, log structures were placed in coho rearing streams adjacent or within previously logged units. The structures help form pools which serve as summer and over-wintering habitat for juvenile coho. The structures were placed in tributaries of Kadake Creek, Saginaw Creek, and Brown's Creek. High stream flows have washed out or damaged some of the log structures.

Environmental Effects

Timber Harvest Effects

Each of the three action alternatives has some associated risk for impacting fish habitat within the study area. The level of impact, if any, is dependent upon the application and effectiveness of the direction provided in the Tongass Timber Reform Act and the Best Management Practices as presented in the Soil and Water Conservation Handbook.



Stream buffers with a minimum 100-foot width are established along all Class I streams and all Class II streams running directly into Class I streams. The TTRA requires that Class I streams and Class II streams flowing directly into Class I streams be protected with a minimum 100-foot buffer. For Class III streams and other Class II streams, the channels inside logging units will be used as split lines or yarded logs will be partially or fully suspended across the channel. Additionally, cleanup of logging debris will be required. Along unit boundaries, the Class III and the other Class II streams require cleanup of logging debris or are provided a variable width buffer.

Stream buffers provide effective protection of habitat features important to fish. They maintain the stability of the stream banks, shade the stream, provide leaf and needle litter to fall into stream channels fueling aquatic food chains, and providing future sources of large woody debris. Stream buffers are also at risk of blowing down. When this occurs, stream bank erosion and stream channel instability may result. Additionally, shade will be reduced and large woody debris (LWD) may enter the channel at an accelerated rate as compared to a more even flow without blowdown.

To minimize blowdown, guidance provided in the Timber Sale Preparation Handbook (154.32a Blowdown Hazard) was used. Wind direction, local topography, stand composition, and historical blowdown were considered in planning the units and buffer strips. Experience has shown that locating units in areas with a low blowdown hazard can be effective in preventing blowdown. Best Management Practices also consider the relative risk of blowdown within sensitive riparian areas during the harvest unit design (BMP 13.2 Timber Harvest unit Design).

Even though the units were carefully designed, some risk exists that buffers will blow over. The amount of risk is generally proportional to the total length of the buffers. The length of stream with 100-foot buffers on one side and on both sides of the channel are presented by alternative for Class I and Class II streams in Tables 3-19, 3-20, and 3-21.



Table 3-19

Miles of Stream Buffer by VCU and AHMU Class for Alternative 2

AHMU Class	VCU	100-Foot Buffer		Extended Width Buffer ¹
		One Side	Both Sides	
Class I	398	0.0	0.0	0.0
	399	0.2	0.0	0.0
	400	0.0	0.0	0.0
	401	0.0	0.0	0.0
	402	1.3	0.0	0.8
	416	0.0	0.0	0.0
	417	0.0	0.0	0.0
	418	0.0	0.0	0.0
	419	0.0	0.0	0.2
	420	0.7	0.0	0.2
	421	0.4	0.0	0.2
Totals		2.6	0.0	1.4
Class II	398	0.0	0.0	0.0
	399	0.7	0.0	0.2
	400	0.2	0.0	0.0
	401	0.0	0.0	0.0
	402	1.7	0.0 ²	0.2
	416	0.0	0.0	0.0
	417	0.0	0.0	0.0
	418	0.0	0.0	0.0
	419	0.5	0.0	0.3
	420	2.6	0.1	0.4
	421	0.9	0.1	0.0
Totals		6.6	0.2	1.1

Source: Cariello, 1992

¹ Extended width buffers average approx. 200 feet.

² An additional 0.1 miles of AHMU (Aquatic Habitat Management Unit) Class II stream running directly into saltwater are provided protection by Best Management Practices.

Table 3-20

**Miles of Stream Buffer by VCU and AHMU Class for
Alternative 3**

AHMU Class	VCU	100-Foot Buffer		Extended Width Buffers ¹
		One Side	Both Sides	
Class I	398	0.0	0.0	0.0
	399	0.0	0.0	0.0
	400	0.0	0.0	0.0
	401	0.0	0.0	0.0
	402	0.7	0.0	0.8
	416	2.4	0.0	0.4
	417	1.6	0.0	0.0
	418	0.9	0.0	1.1
	419	0.0	0.0	0.2
	420	0.5	0.0	0.2
	421	0.0	0.0	0.0
Totals		6.1	0.0	2.7
Class II	398	0.0	0.0	0.0
	399	0.0	0.0	0.0
	400	0.0	0.0	0.0
	401	0.0	0.0	0.0
	402	0.8	0.0	0.2
	416	2.0	0.1	0.4
	417	1.6 ²	0.2 ³	0.6
	418	1.3	0.0	0.0
	419	0.5	0.0	0.3
	420	2.0	0.1	0.4
	421	0.0	0.0	0.0
Totals		8.2	0.4	1.9

Source: Cariello, 1992

¹ Extended width buffers average approx. 200 feet.

² An additional 0.3 miles of AHMU Class II streams running directly into saltwater are provided protection by Best Management Practices

³ An additional 0.6 miles of AHMU Class II streams running directly into saltwater are provided protection by Best Management Practices.



Table 3-21

Miles of Stream Buffer by VCU and AHMU Class for Alternative 4

AHMU Class	VCU	100-Foot Buffer		Extended Width Buffers ¹
		One Side	Both Sides	
Class I	398	0.0	0.0	0.0
	399	0.0	0.0	0.0
	400	0.0	0.0	0.0
	401	0.0	0.0	0.0
	402	1.3	0.0	0.8
	416	0.9	0.0	0.0
	417	1.6	0.0	0.8
	418	0.9	0.0	1.1
	419	0.0	0.0	0.2
	420	0.0	0.0	0.0
	421	0.4	0.0	0.2
Totals		5.1	0.0	3.1
Class II	398	0.0	0.0	0.0
	399	0.7	0.0	0.2
	400	0.2	0.0	0.0
	401	0.0	0.0	0.0
	402	1.7	0.0 ²	0.2
	416	0.7	0.1	0.4
	417	1.6 ³	0.2 ⁴	0.7
	418	1.3	0.0	0.0
	419	0.8	0.0	0.0
	420	0.0	0.0	0.0
	421	0.9	0.1	0.0
Totals		7.9	0.4	1.5

Source: Cariello, 1992

¹ Extended width buffers average approximately 200 feet.² An additional 0.1 miles of AHMU Class II streams running directly into saltwater are provided protection by Best Management Practices.³ An additional 0.3 miles of AHMU Class II streams running into saltwater are provided protection by Best Management Practices.⁴ An additional 0.6 miles of AHMU Class II streams running directly into saltwater are provided protection by Best Management Practices.

For Class I streams, Alternative 3 has the most total length of 100-foot buffers on one side with 6.1 miles, and Alternative 2 has the least with 2.6 miles. Alternative 4 is intermediate with 5.1 miles. The alternatives have no Class I stream buffer on both sides. The greatest total length of Class I one-sided buffer would occur in VCUs 416 and 417 for Alternative 3 and in VCUs 402 and 417 for Alternative 4.

Buffers on Class I streams are often planned to be wider than 100 feet (Tables 3-19, 3-20, and 3-21). The objective of buffers wider than 100 feet or modified vegetative treatments is normally to have the unit boundary at a logical slope break or to provide an extra margin of safety along some of the higher-valued streams. The total length of extended width buffer for Class I streams is 1.4, 2.7, and 3.1 miles for Alternatives 2, 3, and 4, respectively.



For Class II streams, Alternative 3 also has the most planned 100-foot buffers on one side of the stream with 8.2 miles and Alternative 2 the least with 6.6 miles. Alternative 4 is again intermediate with 7.9 miles. Compared to Class I streams, Class II streams have more planned 100-foot buffers on both sides of the channels and fewer miles of extended width buffer (Tables 3-19, 20, and 3-21).

When comparing the alternatives for risk of direct impact to fish habitat from logging, Alternative 2 has the least risk and Alternative 3 the greatest. Again, this is based on the fact that Alternative 2 has the least amount of stream with planned 100-foot buffers for both Class I and II channels, and Alternative 3 has the most (Tables 3-19 and 3-20). Alternative 4 is intermediate (Table 3-21). For all alternatives, the risk is low and the buffers are expected to be effective in protecting fish habitat.

Based on past monitoring of Class I buffer strips on Kuiu Island, we can anticipate a maximum of 0.4 miles of blowdown for Alternative 2 and 0.8 miles of blowdown for Alternative 3 and 0.7 for Alternative 4. The maximum estimate probably will not be reached as experience in designing past units on Kuiu Island was used to minimize buffer blow down with this project. Buffers will be monitored by aerial surveys annually to gain a better understanding of their effectiveness.

It may seem unusual that the alternative with the most stream-side buffer is also judged to have the most direct risk to fish habitat. It should be noted that a reduced length of buffer means less logging will approach Class I and II streams, thus reducing risk. But, no Class I streams or Class II streams running directly into Class I streams will be without the minimum 100-foot buffer in any alternative.

Factors other than length of Class I and II streams planned for 100-foot buffers were considered and judged to be less important. The amount of extended width buffer was considered, but not given much weight as a study in Oregon has shown buffer width was not a good measure of blow down potential (Froehlich, 1989). In fact, Alternative 2 with the least amount of 100-foot buffers also has the least extended width buffer, Alternative 4 has the most, and Alternative 3 is intermediate.



The Best Management Practices are expected to effectively protect stream banks and channels of Class III streams (generally high gradient streams with no fish). Protecting stream banks and preventing abnormal changes in stream channels will minimize increased sedimentation of downstream fish habitat and are the objectives for protection of Class III streams. As with stream-side buffers, some risk exists that split lining and suspension requirements for logs yarded across streams will not provide full protection and some increased impact due to unnatural sedimentation of downstream fish habitat will occur. As with buffers, the risk increases with increasing length of stream channel being protected by the Best Management Practices.

The greatest length of Class III streams protected by BMP's and buffers occurs for Alternative 3 with a total of 19.8 miles. This includes Class III streams with logging to the stream edge on one side, on both sides, and channels with variable width buffers (Table 3-22). Alternative 2 has the least with 12.2 miles and Alternative 4 is intermediate with 17.8 miles.

Table 3-22

Miles of Class III Streams Within or Bordering Units

VCU	Alternative 2		Alternative 3		Alternative 4	
	BMPs	Buffered	BMPs	Buffered	BMPs	Buffered
398	0.0	0.2	0.0	0.0	0.0	0.0
399	0.4	0.0	0.0	0.0	0.4	0.0
400	1.6	0.0	0.8	0.0	1.6	0.0
401	0.0	0.0	0.0	0.0	0.0	0.0
402	2.8	0.0	2.2	0.0	2.8	0.0
416	0.0	0.0	4.8	0.0	1.7	0.0
417	0.0	0.0	2.6	0.0	2.6	0.0
418	0.0	0.0	5.0	0.2	4.7	0.2
419	1.0	0.0	1.0	0.0	1.0	0.0
420	3.8	0.4	3.2	0.0	0.4	0.4
421	1.0	1.0	0.0	0.0	1.0	1.0
Totals	10.6	1.6	19.6	0.2	16.2	1.6

Source: Cariello, 1992

As noted previously, some Class III streams have been provided buffers of variable width in each of the alternatives. These streams are generally in deep V-notches and serve as the unit boundary. Timber harvest will often occur to the slope break above the stream. The length

of Class III streams provided with no cut buffers is greatest in Alternatives 2 and 4 with 1.6 and least in Alternative 3 with 0.2 miles.

Roads

Effects of roads on fish habitat are generally caused by temporarily increased sedimentation during installation of culverts and bridges, sedimentation from the wearing of the road surface, and the possibility of blocking upstream migration of adult or juvenile fish at culverts.



Sediment generated during installation of culverts and bridges is generally proportional to the number of streams to be crossed. The greatest potential for impact is from Alternative 3 with 96 crossings of Class I and II streams and the least for Alternative 2 with 39 crossings (Table 3-23). For crossings of just the Class I streams, Alternative 2 has the least with 16 and Alternative 3 the most with 45. Alternative 4 has 25 crossings of Class I streams. Culverts and bridges on Class I streams and Class II or III streams a short distance upstream from Class I streams are normally installed during a summer "window" when fish eggs and incubating fry are not in the downstream gravel. Additionally, the next cycle of spawning fish tend to clean the gravel while constructing redds. The practice of construction during "windows" is planned for the roads which will be built with all action alternatives and will minimize the negative effects of the short-term pulse of sediment associated with installation of culverts and bridges. Therefore, no differences are expected between the action alternatives.

Sedimentation caused by the fine material generated from the road surface, which migrates through the ditches and eventually enters streams, is controlled by BMP's which would be similarly applied for all alternatives. The risk of increased sedimentation from the road surfaces is generally increased with the length of road to be built. The greatest risk is with Alternative 3 with 120 miles and the least with Alternative 2 with 80 miles. Alternative 4 has 92 miles of road.

Table 3-23

Number of Road Crossings by Alternative

Alternative	Class I Crossings	Class II Crossings	Total Class I and II	Class III Crossings
2	16	23	39	38
3	45	51	96	62
4	25	40	65	53

Source: Cariello, 1992

Upstream fish passage, both for adult and juvenile salmon and trout, can be blocked when culverts are used to cross moderate and high-gradient streams. Occasionally, culverts develop drops at the downstream ends which fish cannot jump over, and, at times, the water velocity within the culvert is too swift for fish to swim against. To reduce these risks, special



emphasis has been placed on monitoring and learning from existing culvert installations, many of them on Kuiu Island, and obtaining the most current information from the literature on fish passage at culverts. This information was used to assist the team in recommending reasonably-priced structures with a high probability of passing adult and juvenile fish for the life of the structure.

The team originally anticipated recommending the special designs for crossing the moderate and steep-sloped (streams with high risk of block migration at culverts) Class I streams for only Alternative 4. The theme for Alternative 4 requires extra measures to protect all resource values within the study area. For example, we planned to install over-sized squashed pipes buried below the natural stream bottom. These pipes will be at, or near, the natural stream grade, fitted with baffles to hold stream gravel (if needed), and be sufficiently wide to cause no restriction of the stream channel. In the end, we decided to recommend the special crossing structures for all moderate and steep-sloped Class I streams for all alternatives. Therefore, there are no differences between the alternatives for the type of structure; all culverts are expected to pass adult and juvenile fish.

Habitat Capability for Fish Management Indicator Species (MIS)

Pink salmon, coho salmon, and Dolly Varden char have been designated MIS. These species depend on spawning and rearing habitat to complete their life cycles. The quality and quantity of habitat on Forest lands determines, to a great degree, the harvestable surplus available to the various user groups.

Pink salmon habitat capability relies on survival in the spawning gravels during the egg incubation period. A number of studies have shown a relationship between egg survival and water quality criteria, including inter-gravel sediment, temperature, water flow, and other factors (Reiser and Bjornn, 1979).

Land management activities can increase the amount of fine sediment which may have a detrimental effect on egg and alevin survival. Any increase in fine sediment is likely to be short term since spawning activity and high flows can remove fine particles from spawning beds (Sheridan and McNeil, 1968; Everest, et.al., 1987). Timing windows have been established to limit the instream activities, such as bridge and culvert installation, to times when eggs are not present in the gravel. Class III stream channel protection on Browns, Security, and Kadake Creek watersheds will be monitored (see Appendix C for monitoring items). The establishment of BMPs seeks to minimize sediment generation and delivery to stream channel systems. The implementation of BMPs and legislation establishing buffer strips should minimize sediment impacts.

Coho salmon and resident Dolly Varden habitat capability is dependent not only on available spawning area but also on rearing area. Coho juveniles spend up to 4 years in fresh water; Dolly Varden may spend their entire lives in fresh water. During this time, both species rely on habitat structure for hiding and survival cover. A large part of this cover is provided by LWD. It is generally accepted that the rearing phase of these species' life cycle is the most limiting (Murphy et al., 1986). Stable pieces of large wood in the stream channels are

among the primary fish habitat-producing components on the forest. LWD and associated organic matter provide energy and habitat structure for fish and aquatic invertebrates and influence such physical factors as sediment storage and channel development. Through the use of stream buffers on Class I and II streams and BMPs, the reduction of LWD should be minimal. In addition, the effect of road crossings will be minimized by providing fish passage for both adults and juveniles on Class I and II streams.



It is not anticipated that habitat capability for the fish MIS would be greatly affected by any of the proposed alternatives which are based on the application of BMP's and 100-foot minimum buffer strips (as prescribed by TTRA).

Cumulative Effects

For the long term, effects of logging and the associated road building on fish habitat will be minimized by application of the streamside buffers of at least 100 feet and the Best Management Practices. Cumulatively, effects on fish habitat include the effects of past logging in riparian areas and the risk the buffers and BMP's will not be effective in preventing impacts for the logging proposed in this plan and for future timber offerings from this study area. As we believe the buffers and BMP's will be effective in minimizing impacts, the cumulative effects are primarily associated with the past logging.

Although most, if not all, direct cumulative impacts to fish habitat will be prevented by the site specific application of buffers and BMP's, more indirect impacts are also of concern. The ability of the watersheds to absorb logging and roading while maintaining acceptable water quality is discussed in the watershed section of this chapter. Indirect cumulative effects on fish habitat will be prevented by maintaining the amount of logging within the threshold level identified for each watershed.



Corrugated metal pipe arch with gravel containment baffles

Marine Environment



Affected Environment

Southeast Alaska has approximately 30,000 miles of shoreline. Along this length a great diversity of habitats account for the complexity of southeast Alaska's estuarine and tidal environments.

The marine environment encompasses a wide variety of ecosystems. This section deals primarily with the intertidal and subtidal marine environments that are subject to effects from log transfer and storage facilities, since those are the points of concentrated activity associated with the marine transportation of logs. This document describes the marine environment and current conditions at Rowan Bay and Saginaw Bay log transfer facilities (LTFs) as a basis for evaluating the incremental impacts associated with the alternatives presented in this analysis. It also addresses the marine environment for No Name Bay and Port Camden where new log transfer facilities are also considered.

The shallow marine waters and associated mud flats that are found in the protected coves and bays provide vital habitat for some commercially important species, such as Dungeness crab, herring, and juvenile salmon. They are part of a complex and dynamic ecosystem that includes shrimp, flatfish, marine worms, starfish, sponges, anemones, sea cucumbers, urchins, shellfish, plankton, marine algae, and other organisms.

The potential impacts that are of concern at log transfer sites relate primarily to the deposition of bark which smothers benthic organisms. The rate of bark accumulation varies with conditions at each facility. The design of the facility partially determines the amount of bark lost (loss of bark has been directly related to the speed of log entry into the water), and the configuration of the location determines the dispersion of the bark by currents and winds. Log raft storage areas accumulate bark at a much slower rate than the immediate area of the log transfer facility. Little quantified information is available that documents decomposition, flushing, recovery times, recolonization rates, or other information about the longevity of bark and its affects on the marine benthic habitat.

An effect of bark and debris accumulation is that little-neck clams and bay mussels have been shown to be eliminated when as little as 4 to 5 inches of bark accumulated (Freese and O'Clair, 1984). Further, Conlan and Ellis (1979) reported molluscs and several polychaetes were excluded by bark debris greater than 2.5 centimeters in thickness, and the effects of bark may last several decades. Deposition of more than a 1-centimeter layer of wood waste has been observed to produce losses of suspension feeding benthos, with major community composition changes associated with a 5-centimeter accumulation (Conlon and Ellis, 1979). In 15-centimeter deposits, suspension feeding organisms were absent and the area was dominated by a few abundant deposit feeding organisms. It can be assumed that other plants and animals that live in and on the bottom would be similarly affected.

The Rowan Bay and Saginaw Bay log transfer facilities (LTFs) have been in operation long enough that deposited bark is a feature of these sites. A SCUBA diving survey of bark debris at the Rowan Bay LTF was conducted during July and August 1990. Approximately 28 acres had a continuous coverage of bark greater than 10 centimeters deep and 6 of those acres had bark greater than 100 centimeters deep. The reported amount of bark in 1990 apparently increased from 1988 when the LTF was previously monitored. The SCUBA diver conducting the monitoring in 1990 indicated some difficulty determining the depth of bark debris over the soft natural substrate. This was because of poor underwater visibility and the difficulty of identifying the substrate by feel through dry suit gloves.



The Saginaw LTF was inspected for accumulating bark in 1987 and 1988. Bark was present between the shore and an off-shore rock ridge. Currents over and beyond the ridge appear to sweep the bark away. In 1988, inside the ridge, approximately 1 acre had a continuous coverage of debris more than 10 centimeters deep.

Freese (1987) indicates that once benthic deposits of bark are in place, they are very resistant to decomposition or transport away from the immediate area. In general, however, the area impacted by bark is relatively restricted. At 32 LTFs evaluated in southeast Alaska, bark deposits average 3.3 acres per site for the 19 sites which accumulated bark (the remaining sites had no bark)(Schultz and Berg, 1976).

Toxic substances occurring as leachates from bark precipitate in saltwater; therefore, leachates do not appear to be a major problem in open water or where good circulation exists (Sedell and Duval, 1985). Recently, dissolved substances, such as hydrogen sulfide and ammonia, have been shown to occur in the interstitial water of bark deposits when bark accumulates on the bottom (O'Clair and Freese, 1984). If Dungeness crabs burrow into the bark deposit, the number of eggs produced is decreased, food habits change, and overall crab survival is decreased. It should be noted that this type of effect has been observed in only one bark accumulation in the field (Rowan Bay log transfer facility) and that, in general, crabs were not found in bark accumulations at a number of other log transfer facility locations. Studies have demonstrated that waste wood leachates in the water can be toxic in concentrated form to fish and shellfish, such as shrimp and salmon. However, in the natural environment, toxic concentrations should not be reached due to adequate flushing and circulation. Regulations requiring monitoring of bark and wood accumulation help quantify the effects in the zone of deposit.

Other effects associated with existing log transfer facilities relate to oil, grease, and petroleum pollution. The source of these contaminants may be the operation and maintenance of equipment used in log handling and transfer operations. Persistent loss of small volumes of petroleum products is a concern, as water soluble compounds have been shown to be toxic to marine larvae and eggs at concentrations of 0.1 mg/l. Daily monitoring for the presence of any visible oil sheen on the water is a standard condition for all new log transfer site permits.

Following are descriptions of the marine environment for the two existing LTFs, Rowan Bay and Saginaw Bay, and the two potential new LTFs, No Name Bay and Port Camden. More

complete descriptions of the alternative sites considered in each bay, LTF designs considered, and additional necessary upland development are available in the files in the Supervisors Office in Petersburg.



Boom boat working on a log raft

No Name Bay

Five catalogued anadromous fish streams enter No Name Bay. A catalogued stream has been given a unique identification number by the Alaska Department of Fish and Game. The goal is to assign a number to all salmon producing streams, although no distinction is made between the low and high producing streams. Inventories of numbers of spawning salmon indicate that No Name Bay is a relatively low producer of commercial salmon, although fry and adult salmon use the bay for rearing and feeding.

Adult crab are caught commercially in No Name Bay and the surrounding area. In the Alaska Department of Fish and Game statistical subdistrict 105-31, average harvest of Dungeness crab was 39,000 pounds for 14 years of harvest between 1969 and 1984. This subdistrict included No Name Bay, Reid Bay, Alvin Bay, and Sumner Strait east to Kupreanof Island and south to Point Baker. Crabbing effort in No Name Bay appears to be variable from year to year. On July 31, 1992, 36 crab pots were observed. This represented 40% of

the crab floats observed during an aerial survey of the entire subdistrict 105-31. Only three floats were observed during a 1987 survey. Both surveys were made during the open Dungeness crab seasons.

Port Camden

Seven catalogued salmon producing streams (including several with noted high production), Slippery Creek (with the recently completed fish ladder), and two unnamed fall chum producing streams (near the head) enter Port Camden.



Two chum salmon egg incubation box projects are on those two unnamed streams. Numerous schools of salmon fry and juvenile herring were observed along the shore of Port Camden during an IDT field trip in April 1988. Abundant growths of aquatic vegetation and clams were also observed in the intertidal zone. Commercial salmon seine and troll fisheries occur in Port Camden.

Port Camden is a winter concentration area for herring and herring spawn along sections of the shore line. During 5 years of commercial fishing from 1969-1984, 2,321 tons of herring were harvested from Port Camden. Stary flounder, Dungeness crab, king crab, tanner crab and shrimp are also commercially harvested. For example, 50,000 pounds of Dungeness crab have been harvested during 7 years of reported data between 1969-1984.

Rowan Bay

Six catalogued anadromous fish streams enter Rowan Bay. Rowan Creek and Brown's Creek are the most important producers. According to ADF&G escapement data for the period 1960 - 1980, Rowan Creek (109-52-07) averaged 8,508 pinks with a peak of 21,800 in 1963. Rowan Creek also produces substantial numbers of coho and chum salmon. Brown's Creek (109-52-08) averaged 6,335 pinks with a peak of 18,500 in 1962. Pink and chum salmon juveniles rear for one to two months in Rowan Bay each spring following emergence and migration from the streams.

Dungeness crab harvest for the combined Rowan Bay and adjacent Bay of Pillars for 6 years of reported data from 1969 through 1984 was 62,000 pounds. The exact division of the catch between Rowan Bay and the Bay of Pillars is unknown, but based on observations of the number of crab trap floats in Rowan Bay a substantial portion comes from Rowan Bay.

Saginaw Bay

Four catalogued salmon producing streams enter Saginaw Bay. Saginaw Creek is the largest producer in the bay. According to ADF&G escapement data for the period 1960-1980, Saginaw Creek (109-44-39) averaged 13,357 pinks with a peak of 45,500 in 1979. Additionally, it averaged 1,151 chums for that period with a peak of 5,260 in 1977. Straight Creek (109-44-35) averaged 470 pinks with a peak of 2,500 in 1961. It also averaged 113 chums with a peak of 600 in 1980. Another stream (109-44-37), which enters saltwater near Straight Creek, averaged 1,254 pinks with a peak of 7,375 in 1980. Additionally, it averaged 424 chums with a peak of 2,000 in 1963. ADF&G multiplies peak escapement counts by 2.5 to account for fish not seen or not present at the time of the peak count.

Dungeness crab are harvested in Saginaw Bay. The estimated catch has been withheld because of State of Alaska nondisclosure regulations. For one year during the period 1969-1984 commercial harvest occurred for spot and coonstripe shrimp. Amount of harvest was again withheld because of nondisclosure regulations.



Environmental Effects

Analysis of cost data for log haul of timber from east Kuiu has lead to a recommendation that a new LTF on east Kuiu Island would create substantial savings compared to hauling to Rowan Bay. Analysis of all the bays on east Kuiu indicated No Name Bay would be the best general location for a new LTF. Consideration was given to effects on all resources and for a central location for reducing haul costs. Nine alternative sites within or just outside of No Name Bay have been considered for a new LTF and three sites have been considered for an associated logging camp. A complete discussion of these analyses are included in Appendix D.

Alternative 2 proposes Rowan Bay LTF be used and no new LTF would be constructed on east Kuiu Island. Alternative 3 proposes construction of a new LTF on a small island at the mouth of No Name Bay (Site 4 in Appendix D) and a logging camp along the south shore of No Name Bay. Alternative 4 proposes a new LTF on a point located just outside No Name Bay on the south side (Site 8) and a logging camp on a small flat along Sumner Strait approximately 0.25 miles south of the entrance to No Name Bay (Site E). Rowan Bay LTF would also be used to water logs from north Kuiu Island with Alternatives 3 and 4. Environmental consequences of constructing a new LTF and camp on east Kuiu Island and continuing to use the existing Rowan Bay facilities are analyzed in Appendix D and are summarized below.

The impacts on the Dungeness crab fishery from the proposed log transfer facility at Sites 4 and 8 were estimated in the following way. ADF&G harvest data for Dungeness crab indicate Subdistrict 105-31 (which includes No Name Bay) produced an annual average of 39,000 pounds from 1969 to 1984. Additional data from Schultz and Berg (1976) indicate for 32 log transfer facilities studied, 18 had an average accumulation of 3.3 acres of bark (no bark accumulated at the others)(Freese, 1987). Approximately 19,800 acres of shallow-water habitat is thought to support Dungeness crab in Subdistrict 105-31. The estimate was determined from United States Geological Survey (USGS) topographical maps by measuring the area between 0 and 60 foot contours. If the assumed 3.3 acres of impacted habitat at Sites 4 and 8 produce crab at the same rate as all the other shallow-water habitat in Subdistrict 105-31, then the expected annual crab catch would decline by 0.02 percent. Noncommercial-sized and female crab would also be reduced at the same rate. Although the model was not sensitive enough to detect differences in effects on crab habitat between sites 4 and 8, site 8 will cause less impact because the water is deeper and has greater currents and wave action to disperse lost bark.

Sites 4 and 8 were selected because of the low potential for impacting marine fisheries. They are outside the sill and no high concentrations of marine species were observed by SCUBA divers. In other words, this habitat should be less productive than the average shallow-water habitat in Subdistrict 105-31.

The effect of a LTF on salmon and herring is expected to be small, at most, as both inhabit the unimpacted water column as compared to the impacted substrate. No herring spawn along the shoreline in the areas considered for LTF development.



An established anchorage at Site 4 would be impacted with an LTF at that location. Although a mooring float or stiff leg has been proposed as a mitigative measure, impact to the anchorage would be eliminated with the LTF located at Site 8.

It is anticipated that a satellite camp from Rowan Bay will be established at or near the LTF site in No Name Bay. The effect of this camp on the marine environment is associated with water use, solid waste disposal, and sort yard effluent. All activities associated with these effects will follow current State Of Alaska regulations and BMPs. Minimal effects are anticipated from these activities.

The Alaska Timber Task Force (ATTF) developed a set of guidelines entitled "LTF Siting, Construction, Operations and Monitoring/Reporting Guidelines". This evaluation has become a widely accepted method of rating potential LTF locations. Table 3-24 shows whether the site meets each guideline or not. Table 3-25 displays the ATTF siting guidelines.



Table 3-24

Comparison of LTF Locations to the Ten Siting Guidelines¹

LTF Site #	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	Total	Main Disadvantage ²
1	1	1	0	1	0	0	1	1	1	1	7	Inside sill
2	1	1	0	1	0	0	1	1	1	1	7	Inside sill
3	0	0	1	1	1	0	1	1	1	1	7	Rock fish concentrations
4	1	1	1	1	0	1	1	1	1	1	9	Requires bridging
5	1	1	1	1	0	0	1	1	1	1	8	Inside sill
6	1	0	1	1	1	0	1	1	0	1	7	Shallow
7	1	0	1	1	1	1	1	0	1	1	8	Unprotected
8	1	0	1	1	1	1	1	0	1	1	8	Unprotected
9	1	0	0	1	0	1	1	0	1	1	6	Unprotected

Source: Aiken, 1992

¹ 1 = meets guidelines 0 = does not meet guidelines

² For a detailed discussion, see Appendix D

Table 3-25

ATTF Siting Guidelines

Guideline	ATTF Discussion
S1	Proximity to Rearing and Spawning Habitat. Location should be 300 feet from the mouths of anadromous fish streams or in areas known to be important to fish spawning or rearing habitat.
S2	Protected Locations. Log transfer and storage area should be sited in weather protected locations suitable for anchoring.
S3	Upland Facility Requirements. LTFs should be sited in proximity to at least 5 acres of relatively flat uplands. There should also be a body of water to provide a minimum 60-lineal-foot space at the operating face.
S4	Safe Access to Facility. The adjoining log sort yard for the facility should be sited where access roads can maintain a grade of 10 percent or less for trucks and 4 percent for specialized equipment.
S5	Bark Dispersal. LTFs should be sited along or adjacent to straits and channels or deep bays where currents may be strong enough to disperse sunken or floating wood debris. Siting LTFs in embayments with sills or other natural restrictions to tidal exchange should be avoided.
S6	Site Productivity. Sites for in-water storage and/or transfer of logs should be located in areas having the least productive intertidal and subtidal zones.
S7	Sensitive Habitats. LTFs and log raft storage areas should not be sited on or adjacent to extensive tideflats, salt marshes, kelp or eelgrass beds, seaweed harvest areas, shellfish concentration areas.
S8	Safe Marine Access to Facilities. Log rafting and storage facilities should be safely accessible to tug boats with log rafts at most tides on most winter days.
S9	Storage and Rafting. Logs, log bundles, or log rafts should be stored in areas where they will not ground at low tide. A minimum depth of 40 feet or deeper measured at Mean Lower Low Water (MLLW) for log raft storage is preferred.
S10	Avoid Bald Eagle Nest Trees. No project construction should be closer than 330 feet to any bald eagle nest tree.

Source: ATTF Committee 1985.1.0 Comparison of LTF Designs

The Rowan Bay and Saginaw Bay LTFs would continue to be used for all alternatives. The amount of logs transferred over existing LTFs would differ between alternatives. For exam-



ple, Alternative 2 would water logs at the existing Rowan Bay and Saginaw Bay LTFs, while Alternatives 3 and 4 would water logs at the existing Rowan Bay and Saginaw Bay LTFs and the proposed No Name Bay LTF.

Little additional impact to the marine environment would occur at Rowan Bay or Saginaw Bay as these LTFs are already constructed and have been previously used for watering logs. Bark has already accumulated on the bottom in front of these facilities. Monitoring of the bark accumulation at both LTFs (a requirement of the current permits) indicates the bark accumulation covers approximately 28 acres at Rowan Bay and less than one acre at Saginaw Bay. The size of the bark accumulation is believed to be related to site characteristics of the individual LTFs more than to the volume of logs watered at the sites. Schultz and Berg (1976) monitored 32 LTFs and found no significant relationship between bark depth and the age of the LTF, volume of timber dumped, type of LTF, and other independent variables. They speculated the amount of bark at an LTF was influenced by tidal action, currents, and physical characteristics of the bottom.

Repeated monitoring at five LTFs on the Stikine Area, including Rowan Bay and Saginaw Bay, has indicated no obvious proportional relationship between the area of bark accumulation and the volume of logs watered at that site. In other words, doubling the volume does not double the area of the bottom covered by the bark. Monitoring results indicate that additional use of an LTF tends to increase the depth of the bark and likely covers a small amount of the presently unimpacted substrate on the fringes of the previous bark pile. Additionally, the size of the pile may decrease during periods of non-use of the LTF.

The magnitude of the impact of continuing use of an existing LTF, like Rowan Bay or Saginaw Bay, is expected to be small in comparison to constructing a new LTF at a presently unimpacted site, like Sites 4 or 8 on east Kuiu Island.

Recreation

Affected Environment



Recreation issues for the Long Term Sale Area were identified through both internal and external scoping, as well as past planning efforts. The issues surrounding recreation generally encompass protection of primitive and semi-primitive recreation values. Land allocations are often intertwined with this issue. Since land allocations are determined in the forest planning process and not an integral part of this analysis, this report will focus on describing the supply and demand of recreation resources in the project area, and the subsequent impact of harvest activities by alternative.

Two land allocation issues are briefly discussed however, as they deal with specific areas which have important implications for recreation. They are currently being analyzed in the Forest Plan Revision. These include Wild and Scenic Rivers, and Special Interest Areas. These rivers and areas will be discussed at the end of this section.

The recreation issues can be summarized as "How can recreation opportunities be protected or enhanced in the design of timber management activities?" Primitive and semi-primitive recreation opportunities are abundant in the area and are the emphasis in achieving this goal. However land allocations are already set for this area, and recognize a certain degree of tradeoffs for this form of recreation opportunity. Thus the objective can be described as "providing for a range of recreation opportunities while minimizing impacts to existing settings".

In addition to the study area, a larger influence area was examined to describe the recreation opportunities present and available for visitors. This area includes all of Kuiu Island outside of the study area, and the Rocky Pass area. This larger area provides a look at semi-primitive and primitive opportunities, and recreation places available to visitors originating from Kake or small communities on northern Prince of Wales Island, as well as from outfitters and guides and other travelers. This will display substitutes and alternative opportunities for visitors who may be displaced by management activities, and thus offers a look at the cumulative effect.

The supply of recreation opportunities will be described and assessed in both quantitative and qualitative terms. The quantitative assessment will focus on changes to the landscape setting, through the use of the Recreation Opportunity Spectrum (ROS) system, and at the site level through the use of the Recreation Place concept. The qualitative assessment is more subjective and will examine attributes, uniqueness, and values in terms of importance to tourism, facilities and marine recreation.

Use and demand analysis is somewhat uncertain due to the ephemeral nature of recreation in this remote location. Existing use trends of cabins and trails in the area will be described as

well as outfitter-guide use. Some general trends and observations from past studies for southeast Alaska will be described to see how Kuiu Island fits into the big picture.

Supply



Recreation Opportunity Spectrum (ROS) is a conceptual tool used to describe settings in a continuum ranging from primitive to urban. Seven categories are recognized along this continuum for inventory purposes, six of which are contained in the analysis area. An ROS class is defined in terms of its combination physical, social, and managerial settings. Certain activities, expectations, and associated user experiences are associated with these classes.

An area rated **primitive** provides for activities in the most remote, most natural, and least accessible settings. Social encounters are rare and few in numbers, and the presence of management in terms of regulations and on site regimentation are virtually non-existent. Primitive 1 areas are most commonly located inland, where access is by foot or road. Primitive 2 areas are pristine, remote areas accessible by motorized craft. Areas rated **semi-primitive** are less remote, provide relatively easier access, and a predominantly natural setting. Social encounters are still few but can be expected, and some passive forms of management may be present. The semi-primitive setting is further divided into non-motorized and motorized along this continuum. Simply put, as one moves along the spectrum into the roaded natural, roaded modified and rural settings, the relative degree of naturalness, remoteness, social encounters and managerial presence moves toward higher frequencies and development.

Currently, 41.5 percent of the study area is classified as roaded modified. Most of this occurs in areas previously logged in the core of North Kuiu. Less than one percent is rural, reflecting the logging community at Rowan Bay. Primitive opportunities make up around 28.3 percent, and can be found on areas in the northern portion of the Camden peninsula, west of Security Bay, and south of Seclusion Harbor. Around 19 percent of the study area is semi-primitive non-motorized, and the remaining 10.9 percent is semi-primitive motorized.

Table 3-26 below outlines the existing ROS settings for the study area irrespective of land ownership. This data shows that nearly half (47%) of the study area provides primitive or semiprimitive recreation opportunity. When the surrounding influence area is considered, the percentage of primitive or semi-primitive opportunity jumps to 87%.

Table 3-26

Recreation Opportunity Spectrum Acres ¹

VCU		Primitive	Semi-primitive	Semi-Primitive Motorized	Roaded Natural	Roaded Modified	Rural
398	Keku Is.	0	6,236	4,473	0	2,621	0
399	Saginaw	0	6,253	4,559	0	14,952	0
400	Security	485	9,394	4,891	0	14,018	0
401	Wash. Bay	12,000	63	1,883	0	0	0
402	Rowan	3,448	5,117	2,381	471	20,969	219
405.1	Alecks	1,668	0	0	0	57	0
416	Alvin	14,568	0	0	0	1,697	0
417	No Name	8,785	0	0	0	1,546	0
418	Seclusion	5,803	1,665	0	0	2,231	0
419	3-mile	4,426	3,509	0	0	11,533	0
420	Camden	16,529	7,965	5,589	40	3,430	0
421	Kadake	0	5,502	2,282	19	26,321	0
Total		67,712	45,704	26,038	530	99,375	219
Percent		28.3 %	19.0 %	10.9 %	0.2 %	41.5 %	0.1 %

Source: Freeman, 1991

¹ Recreation Opportunity Spectrum (ROS) definitions are provided in the Glossary.

Recreation Places

In theory, all acres of National Forest have the potential of providing recreation opportunities. However, due to terrain considerations (very steep, inaccessible areas), user preferences, and presence of certain amenities (scenery, good fishing), some areas are more highly valued. These key sites are termed "recreation places". Their selection and identification was done by noting what characteristics or qualities of a site attract and influence visitor use. A knowledge of these key sites aids in the future evaluation of potential effects within the broader ROS concepts.

The following discussion describes, by VCU, the recreation use and attractors in each general area. Within these areas, there may be one or more recreation places.



Keku Islets - VCU 398: Several anchorages have been identified along Keku Strait. These sites provide boat protection from southeast storms. Beach-combing is possible east of Halleck Harbor. There are three recreation places in this VCU.

Saginaw Bay - VCU 399: Much of the bay's eastern shoreline provides opportunities for rock hounding, fossil collecting, and the study of Native culture. Of special interest is Halleck Harbor. A gentle sloping sand beach and protected anchorage attract numerous boaters. A log transfer site on the south side of the bay provides access to the road system on Kuiu Island. Waterfowl hunting occurs at the head of the bay, and fishing in Saginaw Creek. There are three recreation places and a special use permit for a residence in this area.

The limestone bedrock adjacent to Saginaw Bay and the Keku Islets has been identified as having a high potential for cave formations similar to those found on Prince of Wales Island. Opportunities exist for future trail development to Cool and Ledge lakes, allowing easier access for stream and lake fishing. A fish pass on Dean Creek may encourage future use. Most of the activities in this VCU provide semi-primitive motorized experiences.



Security Bay

Security Bay - VCU 400: Recreational use is generally water-oriented. There are two recreation places in this area. Secure anchorages exist at numerous points along the bays shoreline. Excellent waterfowl and black bear hunting occurs at the head of the bay. The State of Alaska has designated some of the large islands, and parts of the eastern shoreline in the northeast corner of the bay, as a State Marine Park. Marine Park facilities may be developed in the future.

Washington Bay - VCU 401: Much of the land is steep and inaccessible. Activities are usually confined to Washington Bay which is a recreation place. Protected waters for boaters, excellent scenery due to the areas topography, and an old herring reduction plant attract visitors.



Rowan Bay - VCU 402: Contains the islands only population center, an operating logging camp. Access is possible to the internal road system by use of the existing log transfer facility. Hunting and sport fishing occurs in the estuary. Boaters frequently anchor in a small cove on the south shoreline near the bays mouth. There are four recreation places in this VCU. A short trail from the residential center to a few scattered picnic sites along the shoreline, and the placement of several tables along Forest Road 6404 are the only planned recreation developments.

Alecks Lake - VCU 405.1: Current use is confined to the Alecks Creek Portage Trail (4.0 miles total). This recreation place provides kayakers access between Tebenkof Bay Wilderness and No Name Bay. This portage is considered very difficult.

Alvin/Reid Bays - VCU 416: Uncommon southeast-facing sand beaches provide excellent opportunities for beach-combing or future water-play activities. Current use includes bear hunting, recreational boating, and kayaking. Two major anchorages are recognized, one near the head of Alvin Bay, and the other at the extreme southern tip of Reid Bay. There are three recreation places in this VCU. These bays are central to kayaking water trails extending north to Kake, and points south, by providing sheltered waterways. Sumner Island was recently classified as a permanent LUD II under the Tongass Timber Reform Act (TTRA) and is managed to maintain the wildland character of the area.

No Name Bay - VCU 417: Canoe/kayak routes have been identified within the bay (see Appendix L). There are three recreation places in this VCU. A segment of the Alecks Creek Portage Trail (1 mile) provides access to the adjacent Tebenkof Wilderness. Dispersed camping occurs near the trailhead. Boaters find a safe anchorage along the southern shoreline. The bay is used for bear hunting, kayaking, recreational boating, and waterfowl hunting. This bay is also central to kayaking and motorboat routes that extend north through Rocky Pass. Conclusion Island was recently classified as a permanent LUD II under the TTRA.

Seclusion Harbor - VCU 418: There are two recreation places in this VCU. Seclusion Harbor and the adjacent Salt Lagoon are stopover points for canoeists and kayakers. Bear hunting and sport fishing are popular. An anchorage is found near the lagoon's entrance. The inner Salt Lagoon is an exceptionally scenic spot.

Threemile Arm - VCU 419: Recreation opportunities are generally confined to the head of the bay. However, some bird hunting, fishing, and kayak camping does occur in the Hiller Creek estuary along the northeastern shoreline (recreation place). Threemile Arm Portage Trail (1.3 miles total) traverses land separating Port Camden and Threemile Arm (recreation place). A fairly good anchorage exists about 1-1/4 miles southeast of the trailhead. This



portage, in conjunction with the Bay of Pillars Trail, may be used for canoe/kayak access to the Tebenkof Bay Wilderness (see Appendix L). It is also used for a much shorter loop trip from Kake via Rocky Pass.

Port Camden - VCU 420: There are four recreation places in this VCU. Several good anchorages are possible along the eastern shoreline of Port Camden, especially near the island complex west of Slippery Creek. Known shoreline occurrences of petrified material, including fossils of tree species no longer indigenous to Alaska, are also of special scientific interest. Bear and waterfowl hunting opportunities exist at the head of Port Camden. Here canoeists/kayakers can cross into the Bay of Pillars by using the Bay of Pillars Portage Trail or into Threemile Arm using that portage (see Appendix L). Dispersed camping occurs near the trailhead. Future recreational use may be influenced by the development of the Slippery Creek Fishpass. Pristine opportunities for lake and stream fishing exist at Slippery Lake. An impromptu recreation site at the head of Port Camden adjacent to the road system has been developed by residents of Rowan Bay, and contains an anchorage, primitive log dock, and a good beach.

Kadake Bay - VCU 421: There are four recreation places in this VCU. Excellent steelhead, trout, and salmon fishing is possible in the waters of Kadake Creek. Bear and waterfowl hunting occurs throughout the bay. Much of the use is associated with an existing recreation cabin located at the mouth of Kadake Creek. Boats can anchor near the bay entrance or at Gill Harbor, which also contains an excellent salmon fishery. Future plans call for the possible construction of a trail from Forest Road 6415 to the headwaters of Kadake Creek, providing better fishing access.

Summary of Recreation Places Outside of the Study Area but within the Influence Area

Rocky Pass - VCUs 427/428: Recreation use centers around canoeing, kayaking, and the Forest Service recreation cabins at Devils Elbow and Big John Bay. Opportunities for waterfowl and black bear hunting exist along the shoreline. Sections of these VCU's also contain rock outcrops with fossil remains that are of geologic/scientific interest. Viewing the fish pass at Irish Creek has also become popular. Outfitters and guides use the area for their activities. Rocky Pass itself is difficult for large boats to navigate, except for fisherman, outfitters, and others knowledgeable with the waters, thus restricting saltwater access for some. It is popular for canoe/kayakers and small craft.

Bay of Pillars - VCU 403: Canoe/kayaking, fishing and boating opportunities abound. The Bay of Pillars Portage Trail (1.2 miles total) connects Port Camden with the Bay of Pillars, providing access for canoes and kayaks to points such as Kake and Tebenkof Bay Wilderness. Kutlaku Creek is very popular for sockeye fishing. Several secure anchorages exist within the bay, and are often used by fishing guides. An old cannery site exists northeast of Point Ellis. Construction of a fish ladder along Kwatahein Creek may encourage future use. Planned recreation developments include the construction of a 3-sided shelter northeast from Point Ellis, and realignment of the portage trail to utilize easier access provided by roads. Most activities in this bay provide semi-primitive and primitive experiences.

Tebenkof Bay Wilderness - VCU 404-407: The Alecks Creek Portage Trail, and Affleck Canal Portage Trail (1.5 miles total) are the only developed recreation facilities within the Wilderness, in addition to a recreation residence special use permit. The area is used for fishing, hunting, canoe/kayaking, dispersed camping, sightseeing by cruise ships, interpretation of historical native villages, and outfitters and guide activities.



Kuiu Wilderness - VCU 408,409,415: Anchorages exist in Port Beauclerc, Bear Harbor, and Port Malmesbury. The Affleck Canal Portage provides canoe/kayak access into Tebenkof Bay. Hunting, fishing, and use by outfitter guides are known activities in the area.

South Kuiu - VCU 410-414: Anchorages exist in protected waters of this area. Hunting, fishing, nature observation, and use by outfitters and guides are known activities. One outfitter and guide has expressed interest in developing a floating lodge in Kell Bay. The sea otters in southern Affleck Canal provide a destination attraction for outfitters and guides and other recreationists.

Quality

The inventory of recreation places further identified which ones were important to certain values. These values include presence or high potential for facilities (trails, cabins, recreation residence permits, etc.), importance to tourism (outfitters and guides, cruiseships, tours, destination attractions, etc.), and marine recreation (critical anchorages, favorite destinations, unique setting or activities, etc.). Many of the recreation places contain all or a combination of these values.

Facilities listed in this inventory include the existing Portage Trails and three Forest Service cabins previously mentioned. Potential trails identified are generally related to these sites or provide access from the road system to an attraction, such as fishing, within a recreation place. Potential shelters have been identified near Point Ellis in the Bay of Pillars. Recreation residences exist within the Tebenkof Bay Wilderness and Saginaw Bay.

Areas important to tourism include:

- The Portage Trails, which are currently used by outfitters and guides as well as the general public for extended Kayak trips and hiking. A brochure and map describe the potential loop opportunities and alternative routes available to these users.
- The cabins, which receive a fair amount of out-of-state use.
- Tebenkof Bay, for use by outfitters, guides and cruise ships.
- Bay of Pillars, used by outfitters and guides.
- Seclusion Harbor, used by outfitters and guides.
- Security Bay, used by outfitters and guides and potential use due to the State Marine Park.



- Rocky Pass, used by outfitters and guides, and included in the Kayak route brochure.
- Areas in Affleck Canal used by outfitters and guides.
- The waterway "trail" from Cape Decision to Kake provides unique opportunities for extended boating trips with a multitude of anchorages, protected water, scenic beaches, fishing, wildlife, and a sense of remoteness, all combining to provide an "Alaskan Experience".

Areas important for the unique marine recreation include:

- Security Bay, with numerous anchorages and beach related activities, as well as the attraction of scenery, protected waters and potential State Marine Park.
- Saginaw Bay, with numerous anchorages, protected waters, scenery, beach related activities, and road access from the Log Transfer Facility.
- The isthmus areas separating Bay of Pillars from Port Camden, and Port Camden from Threemile Arm.
- Bay of Pillars, which provides anchorages, protected waters, scenery, historical attraction, beach and water-related activities.
- Tebenkof Bay, with its large array of islands, bays, anchorages, protected waters, scenery, historical and cultural attractions, and beach and water-related activities.
- No Name Bay with its many small islands, good anchorages, and hiking opportunities.
- Seclusion Harbor for its scenery and anchorage.

Another interpretation of quality inherent in the above list and the Kuiu area as a whole, entails less tangible values. The Kuiu area is remote from major community centers in SE Alaska, except for Kake. Traveling entails a great deal of expense, a relatively large amount of time, careful planning, and a certain degree of risk. Thus visitor expectations are likely to be for high levels of solitude, feelings of remoteness, natural scenery, and a high level of challenge and self reliance.

Settings which provide for these values in the long term include legislated Wilderness, LUD II, Monuments, and lands allocated to primitive and semi-primitive recreation in the forest plan. Two Wilderness Areas exist in the west and southern portions of the island, Tebenkof Bay and Kuiu. Kuiu Island is immediately south of Admiralty Island National Monument, north of the Coronation and Warren Island Wildernesses, and east of the South Baranof Wilderness. Lands are also designated for primitive and semi-primitive settings around the Bay of Pillars, Rocky Pass, South Baranof Island, and Conclusion and Sumner Islands. Visual evidence of human development is only apparent in the vicinity of Kake, north Kuiu around Saginaw and Security Bays, and more recently in parts of Port Camden and Threemile Arm. However sounds of human activity are apparent in many areas, mainly from logging, road construction, and vehicle activity, generally on a seasonal basis.

Thus many areas exist that provide for semi-primitive and primitive recreation in this portion of SE Alaska. However from a larger context, Kuiu Island can be considered a stepping stone for extended wilderness-type trips lasting several weeks. In this sense, Kuiu Island is part of a unique array of recreation opportunities based on the marine, wild-land, island nature of a large area, which provides a variety of landscapes in a remote and relatively natural setting overall.



Use And Demand

Current Use

Primary access for recreational use on Kuiu Island depends to a large extent on saltwater access. Developed facilities are limited to a few canoe/kayak portage trails that provide access across narrow isthmuses to create loop opportunities, avoid exposed bodies of water, and eliminate traveling long distances, and three Forest Service recreation cabins along the island's eastern shore. Waterfowl hunting is sporadic and usually confined to estuaries. Black bear are prevalent and hunted throughout the area. Fishing for salmon, steelhead, and other trout species occurs in many of the island's streams. Other activities include harvesting edible shellfish, crab, and shrimp. Simply searching for solitude and testing one's self-reliance skills as well as viewing scenery and wildlife are other activities. Although recreational opportunities abound, numbers of users are low. This is no doubt due to the remoteness of the area.

There are no regularly scheduled means of public transportation to Kuiu Island, although air taxi service is available on a charter basis. Roads, accessing the interior of the study unit, are not linked to any inter-island transportation network. The closest Alaska Marine Highway ferry terminal is located in the community of Kake where most canoe and kayaking trips begin. The few residents of Kuiu live mainly at the Rowan Bay logging camp, and use the road system for recreational activities as well as nearby waters of Bay of Pillars and Rowan Bay.

In 1987 an effort to document recreation use on the Tongass was made by the "Southeast Alaska Conservation Council". Individuals were asked to identify areas on the Forest that they had used or enjoyed for recreational or subsistence purposes. According to this survey, the most popular ones in the study area were East Kuiu, No Name Bay, and Rocky Pass.

Visitor use numbers are not collected by the Forest Service for the Kuiu area generally, except for Kadake Bay cabin, Devils Elbow cabin, and for the canoe/kayak portage trails. Visitor use in the Tebenkof Bay Wilderness is estimated yearly, based on observations of district personnel and a resident permittee. These figures indicate an increasing trend in use of the Wilderness, and wide fluctuations in use from year to year, and is likely indicative of the area as a whole.

Recreation use data is displayed in Table 3-27. All information is recorded in recreation visitor days (RVDS). One RVD is defined as 12 hours spent in a recreation activity.



Table 3-27

Cabin and Trail Visitor Use

Year	Kadake Bay Cabin ¹ RVDs	Devils Elbow Cabin ¹ RVDs	Portage Trails ² RVDs
1978	192	394	NA ⁴
1979	98	176	NA
1980	150	526	NA
1981	304	478	NA
1982	48	324	NA
1983 ³	132	224	NA
1984	60	212	NA
1985	346	258	NA
1986	516	92	85
1987	338	276	100
1988	326	314	150
1989	180	410	160
1990	502	176	187
1991	181	12	NA
1992	241	36	NA

Source: Freeman, 1991

¹ Cabin use is based on the number of cabin permits sold (includes size of party times number of days). These figures do not include non-permitted use, which may be fairly common in these remote cabins.

² Portage trails constructed in 1985.

³ Kadake Cabin closed part of the year for maintenance.

⁴ Data not available

Outfitting and guide use in the area is increasing. In 1989, only eight permits identified Kuiu Island as a part of their operating area. In 1992 there were 24 permits issued that identified Kuiu as a part of the operating area. Group sizes vary depending on the outfitter and the nature of the activity. Small groups are typical for hunting and fishing related activities, but larger groups are known to participate in educational and scenic touring of this area in activities such as kayaking.

Cruise ships and sightseeing excursions are known to travel along Chatham Straits on the west side of Kuiu Island, and are reported in Tebenkof Bay and Security Bay. Tebenkof Bay is identified for use in at least one permit. One kayaking group reported two cruise ships anchored in Explorer Basin during their eight days stay in the Tebenkof Bay Wilderness.

Future Use

Predicting future recreation demand is difficult at best. Historical use figures fluctuate widely and depend to some extent on uncontrolled variables such as weather conditions, wildlife, and fish populations, as well as national and international events such as energy prices or political unrest abroad. However, general trends are indicated. Use within the study area is expected to increase slowly but steadily. Hunting, fishing, boating, nature observation, and saltwater canoeing/kayaking will be the predominate user activities. Use by out-of-state residents (estimated at about 1/3 of the total use) is expected to grow as more interest develops in searching out remote, less used areas in southeast Alaska. Interest and use by outfitters and guides is likely to increase as well. Facility development will correspond with anticipated growth and reflect user preferences for outdoor activities. Access will remain saltwater-oriented. (Assumptions upon which these predictions are based can be found in the planning record.)



Wild and Scenic Rivers and Special Interest Areas

The Forest Plan revision process is considering the inclusion of up to 112 rivers identified as eligible, for inclusion to the Wild and Scenic Rivers System. These eligible rivers meet the basic criteria of the act in that they are free-flowing, and contain at least one "outstandingly remarkable" value. Designation generally entails a corridor averaging one quarter mile width on each side of the river.

The rivers have been segmented and classified as Wild, Scenic, or Recreation, based on guidelines in the Wild and Scenic Rivers Act and subsequent direction. In addition a suitability study has been conducted for each river identifying resource values protected or foregone, level of public support, private land, and other factors. Each alternative in the revision process proposes a mix of rivers, segments, and classifications for inclusion into the system. The final decision would require congressional action. In the meantime the outstandingly remarkable values for rivers recommended for inclusion in the system, must be protected to maintain the values and level of classification identified, until a final decision comes about. Four of these rivers are on Kuiu Island, two of them being in land allocations which currently prescribe limited or no development.

The Forest Plan Revision is also considering the designation of Special Interest Areas; areas which contain unique or unusual scenic, historic, geologic, scientific, or other characteristics. One such area has been identified in the Kuiu area, the Keku Islets which are private land for the most part. These rivers and special interest areas are briefly described below:

Fall Dog Creek - Located at the head of Security Bay, this stream meets the guidelines for Wild River designation for four miles. The outstandingly remarkable values include fish, wildlife, scenic and cultural, of regional significance. LUD IV is the current land use designation. It is recommended for inclusion in the system in Alternatives A, B, and P of the Forest Plan Revision.

Kadake Creek - Located at on the north eastern part of the island, Kadake Creek flows into Kadake Bay. Portions of the upper reaches of the river corridor have seen timber harvest



and the presence of roads, as this is in a LUD IV land allocation. Consequently 18 miles of the river are eligible as Recreation, and 5 miles of the river meet the criteria for Wild. The outstandingly remarkable values include fish, historic, recreation, wildlife, and scenery. The river is recommended for inclusion to the system in Alternatives A, B, and P of the Forest Plan Revision.

Alecks Lake and Creek - This creek is located mostly in the Tebenkof Bay Wilderness, however the quarter mile corridor may extend beyond the Wilderness into VCU 405.1, depending on final mapping and designation. This five mile corridor meets the guidelines for Wild River classification and is recommended in alternatives A, B, and D of the Forest Plan Revision. The outstandingly remarkable values include fish, recreation, and historic.

Keku Islets Geological and Scenic Area - These islands are located off the northeast shoreline of Kuiu Island. The proposal also includes a small portion of Kuiu Island at the northern tip of Saginaw Bay, for a total of approximately 1,060 acres. The islands are rich in native Alaskan history, and have an interesting geology, with many limestone formations and small caves. The islands provide good anchorages and recreation opportunities.

Environmental Effects

This section will describe the consequences or impacts to the recreation resource as a result of implementing the various alternatives. Most of the discussion will focus in on the opportunities the setting provides, and how the setting could change with implementation of the action alternatives. The change in the setting has implications to the activities, and the quality of the recreation opportunities present. These changes may be positive for some and negative for others, as the recreation experience is unique to each individual. The demand for recreation and preferred settings can be viewed collectively however, and some implications can be drawn upon the overall supply and demand situation.

In general, the alternatives will change the settings to various degrees. The no action alternative will not modify the current recreation setting. Alternatives which confine harvesting to previously harvested areas will result in little change, and alternatives which expand into previously unroaded areas will have a greater degree of change.

Supply

Recreation Opportunity Spectrum (ROS)

The ROS system is used to describe the changes to the recreational setting on a landscape basis. It is important to remember site specific change to one area, may impact a larger area. This is due to the introduction of the sights and sounds to the area, and decreases in feelings of remoteness and solitude. For instance activity within a drainage, may impact the setting on an adjacent ridgetop. Thus lands designated for primitive or semi-primitive recreation may not provide this type of setting along the fringes of the designation. This does not imply some sort of buffer is needed as these areas generally consider these needs when designing.

nated. However the transition of setting does have a direct impact on the resulting experience.

Alternative 1 is the no action alternative. No management activities would occur under this alternative. The existing recreational settings (ROS), opportunities and quality of experiences would remain the same.



Alternative 2 concentrates harvest within two areas. The first area is within previously roaded and harvested areas in the northern core of Kuiu Island, with some activities expanding this roaded modified core. The noticeable expansions include an area to the west of Rowan Bay, to the north of Cool and Ledge Lakes near Saginaw Bay, inland on the peninsula east of Saginaw Bay, and to the east near Crane Creek overlooking the west side of Port Camden.

The second area expands roading and harvesting activities into the primitive and semi-primitive core of the peninsula between Port Camden and Rocky Pass. Concentrated on the west side of this peninsula, this setting would change to roaded modified, leaving the east side in predominately semi-primitive non-motorized setting. Shoreline along both sides of Port Camden, which is currently semi-primitive motorized with some minor exceptions, would shift to a roaded modified setting with some exceptions.

Alternative 3 would harvest very little in existing roaded modified areas, and would impact two large primitive and semi-primitive areas. One of these areas is the peninsula between Port Camden and Rocky Pass, as described above. The area west of Rowan Bay and near Crane Creek would also change as in Alternative 2.

The other area involves the majority of East Kuiu, between Threemile Arm and Reid Bay. This alternative would shift the existing primitive and semi-primitive settings to a predominately roaded modified environment. This includes areas along most of the eastern shoreline, and areas within the Tebenkof Bay Wilderness around Alecks Lake.

Alternative 4 would concentrate harvest activities within existing roaded modified areas, and expand it as described in Alternative 2. It would enter the primitive and semi-primitive areas of east Kuiu between Threemile Arm and Alvin Bay, though not as extensively as Alternative 3. In addition some harvest activities would begin entry into the primitive core of the peninsula between Port Camden and Rocky Pass, though not nearly to the extent as proposed in Alternatives 2 and 3.

Impacts to east Kuiu would be similar to Alternative 3, with the exception of Reid Bay and the area between it and Alvin Bay, which would remain primitive and semi-primitive. Impacts to the Tebenkof Bay Wilderness would be the same as described in Alternative 3.

A summary of the ROS setting changes indicates Alternative 3 has the greatest impact on existing settings, by shifting primitive and semi-primitive areas to roaded modified and roaded natural settings. Alternatives 2 and 4 have similar amounts of setting changes but impact different areas. Alternative 2 shifts the primitive and semi-primitive setting to roaded modified

and roaded natural in the Port Camden area. Alternative 4 shifts the setting in a similar manner in the east Kuiu area between Threemile Arm and Alvin Bay.

The Draft Tongass Land Management Plan Revision Supplement has identified semi-primitive motorized settings as possibly reaching capacity within the next decade. This setting is primarily along the shorelines. Other ROS settings appear to be well supplied. Alternative 3 impacts this setting the greatest, along Port Camden and east Kuiu. Alternative 4 impacts it moderately in areas other than east Kuiu. Alternative 2 impacts it the least, but still changes these settings toward the developed end of the spectrum in Port Camden.



Using the Recreation Opportunity Spectrum (ROS), Table 3-28 below describes change to the overall recreation character of the project area.

Table 3-28				
Change in ROS Class by Alternative (in acres)				
ROS Class ¹	Alternative 1 ²	Alternative 2	Alternative 3	Alternative 4
P1	41,906	32,135	18,867	32,774
P2	25,804	23,141	13,121	16,489
SPM	45,704	37,724	45,775	39,941
SPNM	26,039	22,763	25,812	24,687
RN	530	1,207	1,529	2,206
RM	99,375	122,396	134,248	123,256
R	219	219	219	219
Source: Tremblay, 1992				
¹ ROS Classes are defined in the Glossary				
² No Action Alternative				

Impacts to Recreation Places

Following is a descriptive analysis of the alternative's impacts to recreation places in the study area. Table 3-29 compares the current situation (Alternative 1 - No Action) using ROS classes that would result should any of the three action alternatives be implemented.

Table 3-29

Recreational Setting (ROS) of Recreation Places Resulting from Alternatives (in acres)

ROS Class ¹	Alternative 1 ²	Alternative 2	Alternative 3	Alternative 4
P1	8,118	1,752	0	6,445
P2	4,611	4,611	2,438	3,119
SPM	13,071	10,978	11,457	13,071
SPNM	3,811	2,371	4,529	3,178
RN	480	480	1,460	1,518
RM	18,333	28,233	28,541	21,093
Total acres	48,425	48,425	48,425	48,425

Source: Tremblay, 1992

¹ ROS Classes are defined in the Glossary

² No Action Alternative

Alternative 1

Under Alternative 1, the No Action Alternative, there would be no additional impacts to recreation places. Recreation places would remain much as they currently exist. (For descriptions of current conditions see "Recreation Places" earlier in this section.)

Alternative 2

This alternative would have minimal impacts to recreation places in the study area, with the exception of the Cool and Ledge Lake areas in Saginaw Bay. Limiting development activities to the north end of the island defers impact to recreation experiences available on the island's east side; maintaining the overall character of the recreation setting. Recreation Places in VCUs 400, 405.1, 416, 417, 418, 419 and 421 would not be affected.

VCU 399 Units 399-16 and 399-18 and associated roading would impact the potential for semi-primitive recreational opportunities at Cool Lake. The previous harvest at the south end of the lake has regenerated to a condition compatible with the roaded natural ROS setting.

VCU 402 Unit 402-23 is in the Rowan Creek recreation place and would have minimal impacts to the recreation experience associated with the creek, as it is a considerable distance from the area of influence. Development associated with the 46041 Road would shift the area from a semi-primitive non-motorized setting to a roaded natural condition. This road would provide recreational access to a small sandy beach cove near the exposed shores of Chatham Strait.

VCU 420 There are five recreation places in this VCU, four of which are saltwater oriented. The recreation place along the eastern shore of Port Camden would be impacted by four harvest units (420-15, 16, 22, 23, and 49). The remaining saltwater places would not be affected by proposed activities. The fifth recreation place encompasses Slippery Lake and surrounding areas. There are fifteen harvest units located in this recreation place. The char-

acter of the area would be impacted by roads and harvest activities, and the Slippery Lake environment would evolve to a roaded modified condition.

Alternative 3



As mentioned earlier, this alternative proposes development in two large primitive and semi-primitive areas. Recreation opportunities and experiences on east Kuiu Island would be permanently altered with the implementation of this alternative. Recreation places in VCUs 399, 400, 401, 419 and 421 would not be affected by this alternative.

VCU 402 Unit 402-23 is in the Rowan Creek recreation place and would have minimal impacts to the recreation experience associated with the creek, as it is a considerable distance from the area of influence. This entire area would shift from a semi-primitive non-motorized setting to a roaded natural setting. Proposed road 46041 would provide recreational access to a small sandy beached cove near the exposed shores of Chatham Strait.

VCU 405.1 Road 6402 runs through the Alecks Lake recreation place associated with the Tebenkof Bay Wilderness Area. The presence of the road would shift the recreation setting from a primitive experience to that of a roaded natural character. The current solitude found in this area would be disturbed by the sounds of harvest activities. The sounds of trucks hauling, horns tooting and chainsaws running would be heard from the canoe/kayak portage from Alecks Lake to No Name Bay. The road has been designed to minimize visibility of rock pits and turnouts for safety have also been included. This road would be an alternate route to the existing portage, and would provide an easily walked portage to Tebenkof Bay from No Name Bay.

VCU 416 Reid and Alvin Bays are each recreation places in this VCU. Activities projected in this alternative would have minimal, direct impacts to either of these recreation places. However, the intensity of development would affect the overall visual experience as traveling north to Reid Bay. In particular, Units 416-28 and 416-30 would dominate the views from Sumner Strait.

VCU 417 The islands on the south side of No Name Bay comprise one of two recreation places in this VCU. The island character would be impacted with the development of the Log Transfer Facility (LTF) in this area. The facility would provide motorized access (ie: mini-bikes, ATVs, etc) to recreationists using east Kuiu. Much of the area currently provides a marine accessible, semi-primitive recreation experience. This would change to a roaded modified condition with the implementation of this alternative. Road access from the LTF and the influx of woods workers from the logging camp would add pressure to an area currently used by outfitter guides for marine access to the canoe portage. The island setting would not be visibly altered by harvest activities, however, past harvest would continue to dominate the views from saltwater.

VCU 418 The Salt Lagoon recreation place encompasses the entire viewshed as seen from saltwater. Units 418-7 and 418-10, as well as the northern half of Unit 418-13 are within this recreation place. Units 418-10 and 418-13 would dramatically alter the visual condition of the Salt Lagoon and, in turn, would impact the unique recreational setting of the Salt Lagoon, changing it to a roaded modified setting.

VCU 420 Impacts to recreation places are the same as in Alternative 2. The recreation place along the eastern shore of Port Camden would be impacted by four harvest units (399-16, 22 and 23). The remaining saltwater places would not be affected by proposed activities. The fifth recreation place encompasses Slippery Lake and surrounding areas. There

are many harvest units located in this recreation place. The character of the area would be impacted by roads and harvest activities, and the Slippery Lake environment would evolve to a roaded modified condition.

Alternative 4

This alternative would have similar impacts as Alternative 3, with the exception of Reid Bay and the area between it and Alvin Bay. Roading and harvest is limited to the north side of Alvin Bay, maintaining the character of these recreation places. Recreation places in VCUs 400, 401, 419, 420 and 421 would not be affected with the implementation of this alternative.



VCU 399 Impacts are identical to those described in Alternative 2. Units 399-16 and 399-18 and associated roading would impact the future potential for semi-primitive recreational experiences at Cool Lake. The previous harvest at the south end of the lake currently dominates the recreation setting.

VCU 402 Impacts are identical to those described in Alternative 2. Unit 402-23 is in the Rowan Creek recreation place and would have minimal impacts to the recreation experience associated with the creek, as it is a considerable distance from the area of influence. Proposed road 46041 would provide recreational access to a small sandy beached cove near the exposed shores of Chatham Strait.

VCU 405.1 Impacts are identical to those described in Alternative 3. Road 6402 runs through the Alecks Lake recreation place associated with the Tebenkof Bay Wilderness Area. The presence of the road would shift the recreation setting from a primitive experience to that of a roaded natural character. The current solitude found in this area would be disturbed by the sounds of harvest activities. The sounds of trucks hauling, horns tooting and chainsaws running would be heard from the canoe/kayak portage from Alecks Lake to No Name Bay. The road has been designed to minimize visibility of rock pits and turnouts for safety have also been included. This road would be an alternate route to the existing portage, and would provide an easily walked portage to Tebenkof Bay from No Name Bay.

VCU 416 Reid and Alvin Bays are each recreation places in this VCU. Activities projected in this alternative would have minimal, direct impacts to either of these recreation places. Roading and harvest stop at Unit 416-8, above the north side of Alvin Bay. The southern half of this unit enters the Alvin Bay recreation place, but would not impact the recreational experience.

VCU 417 The islands on the south side of No Name Bay comprise one of two recreation places in this VCU. The log transfer facility (LTF) located at Rocky II would provide motorized access (ie: mini-bikes, ATVs, etc..) to recreationists using east Kuiu. Much of the area currently provides a marine accessible, semi-primitive recreation experience. This would change to a roaded modified condition with the implementation of this alternative. Road access from the LTF and the influx of woods workers from the logging camp would add pressure to an area currently used by outfitter guides for marine access to the canoe portage. Past harvest would continue to dominate the views from saltwater.

VCU 418 The Salt Lagoon recreation place encompasses the entire viewshed as seen from saltwater. Units 418-7 and 418-10, as well as the northern half of unit 418-13 are within this recreation place. Units 418-10 and 418-13 would dramatically alter the visual condition of the Salt Lagoon and, in turn, would impact the semi-primitive and unique recreational setting of the Salt Lagoon.



Table 3-30 describes the change by Recreation Opportunity Spectrum (ROS) class which would occur with the implementation of each alternative. This is a tool used to display the degree of change to the current scenario, and is not intended to display allocations by ROS class.

Table 3-30

Recreation Opportunity Spectrum (ROS) Acres

		ROS Class						
VCU	Alternative	P1	P2	SPNM	SPM	RN	RM	R
398	Alt 1	0	0	6,236	4,474	0	2,621	0
	2	0	0	6,236	4,474	0	2,621	0
	3	0	0	6,236	4,474	0	2,621	0
	4	0	0	6,236	4,474	0	2,621	0
399	Alt 1	0	0	6,253	4,559	0	14,952	0
	2	0	0	5,668	3,207	677	16,211	0
	3	0	0	6,253	4,559	0	14,952	0
	4	0	0	5,668	3,207	677	16,211	0
400	Alt 1	48	485	9,394	4,891	0	14,018	0
	2	48	437	9,394	4,891	0	14,018	0
	3	48	437	9,394	4,891	0	14,018	0
	4	48	437	9,394	4,891	0	14,018	0
401	Alt 1	6,294	5,705	63	1,883	0	0	0
	2	6,294	5,705	63	1,883	0	0	0
	3	6,294	5,705	63	1,883	0	0	0
	4	6,294	5,705	63	1,883	0	0	0
402	Alt 1	2,665	783	5,117	2,381	471	20,969	219
	2	2,427	783	4,143	2,381	471	22,189	219
	3	2,380	451	3,946	2,381	471	22,754	219
	4	2,427	783	4,134	2,381	471	22,189	219
405.1	Alt 1	0	1,668	0	0	0	57	0
	2	0	1,667	0	0	0	57	0
	3	0	0	749	0	831	145	0
	4	0	0	749	0	831	145	0

Table continued on next page

Table 3-30

Recreation Opportunity Spectrum (ROS) Acres

		ROS Class						
VCU	Alternative	P1	P2	SPNM	SPM	RN	RM	R
416	Alt 1	8,469	6,099	0	0	0	1,697	0
	2	8,469	6,099	0	0	0	1,697	0
	3	1,466	4,232	2,824	0	0	7,743	0
	4	5,585	6,099	1,314	0	0	3,267	0
417	Alt 1	3,602	5,183	0	0	0	1,546	0
	2	3,602	5,183	0	0	0	1,546	0
	3	114	0	1,119	0	168	8,928	0
	4	114	0	1,119	0	168	8,928	0
418	Alt 1	3,338	2,464	1,665	0	0	2,231	0
	2	3,338	2,464	1,665	0	0	2,231	0
	3	816	0	672	0	0	8,210	0
	4	816	0	672	0	0	8,210	0
419	Alt 1	3,993	433	3,509	0	0	11,533	0
	2	2,761	430	804	0	0	15,474	0
	3	2,761	430	804	0	0	15,474	0
	4	3,993	433	804	0	0	14,238	0
420	Alt 1	13,497	3,032	7,965	5,569	40	3,430	0
	2	5,196	373	5,862	3,645	40	18,418	0
	3	4,988	1,866	8,058	5,673	40	12,906	0
	4	13,497	3,032	5,899	5,569	40	5,495	0
421	Alt 1	0	0	5,502	2,282	19	26,321	0
	2	0	0	3,889	2,282	19	27,934	0
	3	0	0	5,326	2,282	19	26,496	0
	4	0	0	3,889	2,282	19	27,934	0

Source: Tremblay, 1992

Effects to Use and Demand

Alternative 1 (No Action) would maintain the current recreation experience opportunities. Use and demand levels would fluctuate with social and economic trends.



Generally, none of the action alternatives would affect the recreation setting of the Kadake or Devil's Elbow recreation cabins or the Security Bay Marine Park (State of Alaska). Activities are not proposed in these areas.

Alternative 2 would have the second least affect to use of the area, as activities would be concentrated in the north Kuiu area which already has an extensively developed character. The recreation use and opportunities found in the East Kuiu area would remain the same. No Name, Alvin and Reid Bays would not be developed at this time. However, the Port Camden area would move from the semi primitive setting to one of a roaded modified character, which could affect use patterns in the area.

Alternative 3 would develop the east Kuiu area as well as Port Camden, and has the greatest potential for negative affects to recreation use in areas currently providing semi primitive experiences. The Salt Lagoon, No Name Bay, Alvin and Reid Bays would move from a semi primitive setting to that of a roaded modified condition.

Alternative 4 would develop the east Kuiu area as well, but not as extensively as Alternative 3. Only the northern portion of Alvin Bay would be developed. The east half of Port Camden would continue to provide semi primitive opportunities.

Effects to Wild and Scenic Rivers and Special Interest Areas

As discussed previously, there are three rivers within this study area that are eligible for Wild and Scenic river designation in the revision of the Tongass Land Management Plan. One Special Interest Area is proposed.

Fall Dog Creek (VCU 400).....	Wild River - 4 miles
Kadake Creek (VCU 421).....	Recreation River - 18 miles
.....	Wild River - 5 miles
Alecks Lake and Creek (VCU 405 & 405.1)	Wild River - 5 miles
Keku Islets (VCU 398)	Special Interest Area

In all alternatives there would be no impacts to the existing characteristics associated with the Fall Dog or Kadake Creeks or the Keku Islets. Activities are not proposed within or adjacent to these areas.

In Alternatives 3 and 4, the Alecks Lake and Creek area could be affected (during working operations) by the sounds and activities associated with timber harvest and road construction. As proposed, Road 6402 would be located at least one quarter mile from the eastern most end of the river buffer, which overlaps into the LUD I Release area. Alternative P in the Supplement to the Draft EIS for the TLMP Revision allocates this currently designated LUD I Release area (VCU 405.1) to Semi-Primitive Recreation, which would allow a road to pass through this area. As noted in the Road Card for this road segment, rock source location and road turnouts would require special consideration to minimize permanent impacts to the character of the setting.

Cumulative Effects

Recreation opportunities in the study area would shift from primitive and semi-primitive experiences to a mix of primitive, semi-primitive, and roaded recreation opportunities. The changes to the ROS classes as identified in the action alternatives are consistent with the current Forest Plan land allocations. The long term timber sale contract extends to the year 2011; reasonably foreseeable affects of meeting the contractual commitments have been examined with regard to their potential impacts to recreation opportunities in and around Kuiu Island.



Forest Service management activities would directly affect the variety and quality of recreation opportunities and experiences available to the user. At present, the island is not readily accessible to persons other than residents of Rowan Bay or the saltwater recreationist. The island is not connected to any other transportation system (ie: Alaska Marine Highway) and therefore the addition of roads to Kuiu Island is not seen as a benefit to roaded recreation opportunities. These additional proposed roads would result in a change in the recreational experiences for the saltwater recreationist.

Use of the study area by recreationists is expected to continue although use patterns may be altered for some users depending upon the alternative implemented. The changes of use patterns or the displacement of some users will vary upon the type of activity in which they are engaged, the timing of disruptive activity which may detract from their experience, and the degree of acceptance changes to the landscape where traditional activities may have occurred. While the implementation of a action alternative may have effects for specific user groups, the availability for use by recreationists is not significantly reduced at this time or in the foreseeable future.

Cruise ships and sightseeing excursions are known to travel along Chatham Straits on the west side of Kuiu Island, and are reported in Tebenkof Bay and Security Bay. Tebenkof Bay is identified for use in at least one permit. One kayaking group reported two cruise ships anchored in Explorer Basin during their eight days stay in the Tebenkof Bay Wilderness.

From the recreation perspective, roaded areas are more attractive for recreation when logging is not occurring due to traffic and noise associated with logging. Harvest of beach units have the greatest impacts to recreationists within the study area as most recreation activities are beach oriented or occur within a short distance of the beach.

VCU 398 Keku Islets Should development occur, road construction and harvest would change existing semi-primitive opportunities to roaded experiences. Use is currently confined to shoreline activities. No change in user demand is anticipated.

VCU 399 Saginaw Bay Recreation opportunities at the head of Saginaw Bay, especially near the immediate shoreline, are likely to remain semi-primitive. However, the marine recreationist would notice timber harvest on the adjacent hillsides and would have less chance for a remote and isolated recreation experience.



Additional recreation pressure may occur within the area as a result of the State's development of selected land northeast of the VCU. Overall recreation use within the VCU is expected to be intermittent and seasonal in nature.

VCU 400 Security The land east of Security Bay would continue to provide opportunities for roaded recreation. Evidence of human activity would continue to be evident. The State of Alaska Marine Park would become more of an attraction should the State begin to promote and plan for these areas. In the reasonably foreseeable future, views from the marine park of the west side of the bay would be maintained in a pristine, natural condition. The salt chuck to the south would continue to provide a primitive setting.

VCU 401 Washington Bay Should timber operations occur, they would likely be confined to isolated areas, accessed by helicopter. In these locations a shift from semi-primitive to roaded modified opportunities would occur. Use is currently low and expected to remain water-oriented.

VCU 402 Rowan Bay Recreation opportunities are associated with roads and the access they provide for the residents of Rowan Bay as well as for visitors to Kuiu Island. Much of this area is currently roaded; float planes fly in and out of Rowan Bay on a regular basis. Plans for continued harvest operations in this area would have minimal effects on visitor experiences. Nevertheless, potential harvest on the north side of the bay entrance would shift that land classification from non-motorized to Roaded Modified. Road access to the land surrounding the bay would permit increased use of the road network within close range of the logging camp.

VCU 403 Bay of Pillars No logging is planned under the current land use designation. Canoe/kayaking and boating opportunities abound. Although there is no timber harvest allowed in this area, the sound of trucks moving along the beach fringe road could affect the recreational experience.

VCU 405.1 Tebenkof Bay Management activities in this VCU would have temporary effects to the Alecks Lake recreation experience. During harvest operations, the sounds of logging trucks and vehicles would detract from the recreation experience. The presence of the road corridor would alter a currently pristine canoe portage experience to a roaded one. This road could be used as an alternate portage route; providing an option to the recreationist (i.e.: a pristine, challenging portage; or a roaded, even-terrained link to the wilderness).

VCU 416 Alvin/Reid Bays Recreational use within this area is confined to both Alvin and Reid Bays and their beach fringe areas. Timber harvest and road construction along this shore may displace some of the recreation users who seek solitude and remote environments. In addition, boaters in Reid Bay who seek a remote experience could be adversely impacted as timber-related development becomes more visually evident. Interior areas are difficult to access, favoring primitive recreation experiences. Should the area be developed, future timber operations would shift this area to a roaded condition.

VCU 417 No Name Bay Planned harvesting and road building would expand the potential for roaded recreation opportunities. A demand for fishing and hunting in an interior lake system could develop as roads provide easier access. Saltwater access to the road system would be possible by use of the proposed log transfer facility. Access from the Rowan Bay logging camp to East Kuiu Island has the potential for user conflicts.

Canoe/kayak access to the Tebenkof Bay Wilderness is provided along a portage trail connecting Alecks Lake to No Name Bay. A collector road could bisect this trail, providing an alternate portage route as mentioned in the description for VCU 405.1.

VCU 418 Salt Lagoon Excellent hunting (duck/geese) and fishing opportunities exist within Seclusion Harbor and the adjacent salt lagoon near the eastern boundary of the VCU. This recreational use is dependent to some extent on the fact that the area limits motorized access. Proposed road construction and the harvest of timber in this viewshed could displace those users seeking solitude. Interaction between the working user and the recreating public could occur.

VCU 419 Three Mile Arm Recreation opportunities in the northern portion of this VCU would shift from Primitive and Semi-Primitive Non-Motorized to Roaded Modified conditions. Road construction and harvest activities near the shore may negatively impact boaters and those recreation users who seek remote and isolated experiences. The estuarine area at the head of the bay provides opportunities for hunting and fishing. The quality of experience for these users could decrease. A canoe/kayak portage trail connects Three Mile Arm to Port Camden. Logging of the surrounding timber has occurred, and may have adversely affected some users. However, others may take advantage of the road's presence and use it as a portage. Much of the degree of impact is dependant on the expectation of the user.



VCU 420 Port Camden Most of this VCU is classified as Primitive or Semi-Primitive Non-Motorized ROS class. Existing harvest on the west side of Port Camden is visible from saltwater. Expansion of this road system and related harvest would further increase the sense of development, decreasing the feeling of remoteness. Timber operations and associated road construction on the east side would modify the environment to such a degree they would be readily evident, dominating the recreation experience. Recreation opportunities would shift along the spectrum to Roaded Modified.

The configuration of the bay and the estuarine areas attract recreation use. The island complex on the east shoreline provides a good anchorage for boaters. Some users would be displaced to other areas where human activity is not evident. Should a log transfer facility be constructed in the future in the Port Camden area, vehicular access to Kuiu Island from Kake could be more likely. This would open the road system to greater and more varied use than is currently present.

VCU 421 Kadake Recreation use over a large part of this VCU is roaded and highly developed. However, semi-primitive opportunities near the bay and cabin would remain unchanged. Harvest upstream from the cabin could have an impact on future recreation use of the area. Cabin bookings are very closely associated with fishing in Kadake Creek. Major timber operations along the stream would affect the feeling of remoteness. The eastern half of the VCU and along its northern boundary would also change from a primitive condition, to those associated with road access and development.

Soils



Affected Environment

Soil development on Kuiu Island has been strongly influenced by high precipitation and cold soil temperatures. Under such conditions, organic matter decomposes slowly and tends to accumulate on site. Tree rooting is generally very shallow, even on deep soils, with most of the roots present in the surface organic layers and the upper few inches of mineral soil. Typically this rooting zone is never dry, is very acidic, and contains most of the nutrients available for plant growth.

Soil productivity and nutrient status can be influenced in a number of ways by timber management activities. Removing the canopy of mature and over-mature forest allows increased solar radiation to penetrate and warm the soil. Increased soil temperature accelerates microbial activity and nutrient cycling, thus increasing the availability of soil nutrients, particularly nitrogen. The result is a proliferation of rapidly growing forbs, shrubs, and tree seedlings. Consequently, the net annual biomass production is greater than it was in the old growth forest. This effect is relatively short lived however, and tends to diminish as the young forest stand canopy closes and again shades the soil surface.

With a substantial proportion of nutrient capital of these soils in the upper organic-rich layers, destruction or removal of these layers will have a severe adverse effect on tree growth. This can occur by landslides, surface erosion, severe burning, yarding disturbance, or by displacement by roads, skid trails, landings, or rock pits. Also, soil damage can occur by compaction or puddling, which impedes soil drainage and thus reduces productivity. The allowable limits of these kinds of soil disturbance are described in the Region 10 Soil Quality Standards (FSM 2554 R10 Supplement 2500-92-1, effective 1/15/92).

Most undisturbed soils in the Kuiu Island Study Area are very resistant to surface erosion. Thick layers of surface organic matter and surface mats of vegetation act as protective covers that minimize surface erosion. Soil mass movement is the dominant erosional process.

Most landslides occur during, or immediately after, periods of heavy rainfall when soils are saturated. Particularly hazardous areas are steep slopes containing soils with distinct slip-planes such as compacted glacial till or bedrock sloping parallel to the surface. When subjected to heavy rainfall, these areas have a high likelihood of mass movement, especially if disturbed by blasting of rock pits or road pioneering, side casting of excavated material, or logging practices that cause substantial surface disturbance.

Recent research on landslides in southeast Alaska (Swanston, 1989) has concluded that over 90 percent of all landslides in the past 20 years were not related to logging or roads. Logging and roads can increase the potential for landslides in a given site.

Vegetation, tree roots in particular, have a stabilizing effect on slopes. Strength of tree roots tends to decrease significantly four to seven years after the tree is cut. This decrease in soil holding capability results in an increased likelihood of soil movement on steep slopes following clearcutting. Further, the displaced roots of uprooted trees can disturb the soil mantle whenever windthrow occurs. Under natural conditions, windthrow is an important triggering device of debris avalanches and flows in Southeast Alaska.



A planning level stability analysis of the study area was conducted on the Soil Resource Inventory of Kuiu Island. Landslide hazard classes are used to group soil map units that have similar properties regarding the stability of natural slopes. Three classes (high, moderate, and low) rank soil units according to their relative potential for mass wasting. Table 3-31 displays the distribution of soil hazard classes and Table 3-32 displays the acres of past harvest in the three soil hazard classes. (Maps of the soil hazard classes are available in the planning record and were used in establishing the design and location of the proposed activities.)

Table 3-31

Distribution of Soil Hazard Classes

	Management Area S04		Management Area S09		Total	
	Acres	Percent	Acres	Percent	Acres	Percent
Low	383,775	87%	123,146	76%	506,921	84%
Moderate	44,968	10%	31,522	20%	76,490	13%
High	12,366	3%	6,196	4%	18,562	3%

Source: Kissinger, 1991

Table 3-32

Existing Managed Stands by Soil Hazard Classes

	Management Area S04		Management Area S09		Total	
	Acres	Percent	Acres	Percent	Acres	Percent
Low	10,581	55%	1,976	57%	12,557	56%
Moderate	8,138	43%	1,322	38%	9,460	42%
High	400	2%	162	5%	562	2%

Source: Kissinger, 1991



Wetlands

Wetlands serve important functions of providing wildlife habitat, groundwater recharge, flood control, and water quality enhancement. The Forest Service, as well as other federal agencies, are required by Executive Order 11990 to preserve and enhance the natural and beneficial values of wetlands in carrying out their land management responsibilities. Like much of southeast Alaska, Kuiu Island contains a large proportion of wetlands. These wetlands are comprised mainly of muskegs and forested wetlands as well as smaller amounts of estuarine and alpine meadows.

Table 3-33

Distribution of Wetlands (in acres)

Wetland Type	Management Area S04	Management Area S09	Total
Muskeg	2,728	5,288	8,016
Tall Sedge Wetland	2,274	968	3,242
Estuarine Wetland	622	203	825
Forested Wetland	26,611	27,088	53,699
Alpine Wetland	9,734	4,907	14,641
Total Acres	41,969	38,454	80,423
Percent of Area	10%	24%	13%

Source: Kissinger, 1991

Approximately 13 percent of the study area is classified as wetland as defined by the Federal manual for Identifying and Delineating Jurisdictional Wetlands, 1989. (This Federal manual is currently being revised.)

Floodplains

Floodplains on Kuiu Island are typically found on broad, flat, U-shaped valleys and on alluvial fans at the base of steep mountain slopes. They are dominated by riparian forest vegetation, primarily Sitka spruce or mixed Sitka spruce/western hemlock plant communities with an understory of devil's club, salmonberry, and blueberry. Soils are typically deep, well drained soils and developed in alluvial sand and gravel with relatively thin surface organic layers. Approximately 6,446 acres of floodplains have been identified, most of which occur in the larger watersheds such as Kadake, Rowan, and Saginaw Creeks.

Caves

The limestone bedrock formations in the Saginaw Bay vicinity are similar to those of north Prince of Wales Island that contain extensive cave resources. On Kuiu Island, this formation consists of a narrow band on either side of Saginaw Bay and extends in a southeasterly direction to the northwestern side of Kadake Creek. Although this area has been identified as po-

tentially containing caves, there are no known extensive cave systems in the study area. If caves are encountered during forest management activities the, Forest Plan standards and guidelines relative to the protection and management of cave resources will be followed.



Environmental Effects

Soil Productivity

Management practices designed to protect the long-term productivity of the soil have been applied to all alternatives (refer to unit and road cards). These practices include the following:

- Partial suspension of logs (lead end of log suspended above the ground) is recommended on all cable yarding settings. This is primarily to prevent displacement of the nutrient rich surface soil layers.
- Full suspension of logs (both ends of the log suspended above the ground) by skyline cable systems or helicopter is designated on a few areas where needed to prevent excessive erosion or landslides.
- Shovel yarding is designated on gently sloping alluvial soils that have thin easily disturbed surface soils. This is to minimize displacement of organic horizons and exposure of mineral layers that could result in the establishment of brush species, such as alder and/or salmonberry, to the detriment of conifer regeneration.
- Roads are designed to maintain the natural drainage pattern to prevent detrimental changes in soil drainage.
- Length and width of temporary spur roads are to be kept to a minimum to reduce the amount of forest land disturbed.
- All disturbed area of bare mineral soil will be revegetated by application of the prescribed grass seed and fertilizer during the current growing season.

There will be little or no difference in effect on soil productivity between alternatives, since nearly all high hazard soils have been avoided (Table 3-34), and the above practices are applied to all alternatives. All alternatives are expected to equally meet or exceed Soil Quality Standards (FSM 2524 R10 Supplement 2500-2-1), and therefore, have no measurable adverse effect on the long-term productivity of the soil.

Soil Erosion

The relative risk of excessive soil erosion from timber harvest can be rated in terms of the amount of timber harvest and road construction on hazardous soil types. Soil hazard classes rank the probability of soil erosion, in the form of mass movement, resulting from logging



or road building activities. The probability is related to a number of factors such as soil strength, soil wetness, and slope. In general, soils in the low hazard class are found on relatively gentle slopes. They are stable in the natural setting and have little probability of soil movement if disturbed. Moderate hazard soils are generally found on about 35 to 75 percent slopes. They are usually stable in the natural setting but the probability of movement increases if they are disturbed. The soils in the high hazard class are typically found on slopes of 75 percent and greater. They often show signs of soil instability in a natural setting and are extremely prone to soil movement if disturbed. Consequences from timber harvest are related to the number of acres harvested and the soil hazard class on which the trees are growing.

Table 3-34 shows the area of land in each hazard class that would be harvested in each alternative. This data is derived by comparing the proposed harvest units to the Soil Resource Inventory in the GIS. Areas proposed for harvest on high hazard soils in Alternative 3 represent portions of units 416-27, 28, and 30 south of Alvin Bay. If Alternative 3 is selected, these areas will be field verified prior to or during unit layout. Verification will include an analysis of the risks of mass wasting and an evaluation of the potential impacts to other resources. Some changes in design and configuration of units and roads can be expected as a result.

Table 3-34

Acres of Proposed Harvest by Soil Hazard Class¹

Soil Hazard Class	Alternative			
	1	2	3	4
Low	0	1,855	1,900	2,268
Moderate	0	3,189	3,610	3,284
High	0	0	75	0
Total	0	5,044	5,585	5,552

Source: Kissinger, 1992

¹ Acres include entire partial cut unit area.

Road building impacts are related to the length of road constructed and the soil hazard class in which each segment is built. Table 3-35 shows the miles of road in each hazard class for each alternative. Road segments on steep slopes and/or moderately unstable soils are identified on the road cards. These areas generally require full bench construction, and in some cases, also require end-haul of overburden material to minimize the risk of slope failure.

Table 3-35

Miles of Proposed Road by Soil Hazard Class ¹

Soil Hazard Class	Alternative			
	1	2	3	4
Low	0	53	82	64
Moderate	0	28	38	28
High	0	0	0	0
Total Miles	0	81	120	92

Source: Kissinger, 1991

¹ Includes both forest development and temporary road miles.

Wetlands

Since a large amount (about 13 percent) of the study area is classified as wetlands, they are not considered a scarce resource. Wetland functions and values vary greatly depending on the type of wetland, proximity to water bodies, landscape position, etc. Alternatives were designed to minimize potential impacts to known high value wetland areas rather than to avoid development on all areas classified as jurisdictional wetlands. Habitat values of wetlands such as estuarine or riparian wetlands are described in the wildlife section.

An indication of the potential impact to wetlands is the amount of forested wetlands proposed for harvest (Table 3-36), and the amount of specified road proposed to be built on areas classified as wetland (Table 3-37). Alternative 3 would harvest the greatest amount of forested wetlands, followed by Alternatives 4 and 2, respectively.

Table 3-36

Acres of Proposed Harvest on Wetlands

	Alternative			
	1	2	3	4
Acres	0	426	469	467

Source: Kissinger, 1991

The wetland vegetation, soil drainage or hydric character of a wetland will not be measurably altered by road construction except for the width of the road-fill itself. This is normally about 24 feet wide and amounts to approximately 2.9 acres per mile. Alternative 2 would result in somewhat less road construction on wetlands than Alternative 4, and substantially less than Alternative 3.



Table 3-37

Proposed Specified Road on Wetlands

	Alternative			
	1	2	3	4
Miles	0	28.1	51.0	34.5
Acres Covered	0	81.0	148.0	100.0

Source: Kissinger, 1991

To date, 1,127 acres of forested wetlands have been harvested and 51 miles of road have been built on wetlands within the study area. The cumulative effects of each alternative are presented in Table 3-38.

Table 3-38

Cumulative Wetland Impacts

	Alternative			
	1	2	3	4
Acres of Road	149	230	297	249
Acres of Timber Harvest	1,127	1,553	1,596	1,594
Total	1,276	1,783	1,893	1,843
Percent of Wetlands	1.6%	2.2%	2.4%	2.3%

Source: Kissinger, 1991

Floodplains

Executive Order 11988, dealing with floodplain management, was largely intended to reduce the risk of property loss, minimize the impact of floods on human safety, health and welfare; and to restore and preserve the beneficial values served by floodplains. None of the proposed alternatives would result in human occupancy of floodplains. Because the proposed action would have no floodplain development other than stream crossings and some timber harvest, there will be no anticipated loss of property values, nor will human health, safety, or welfare be adversely affected. Table 3-39 shows the amount of harvest and road construction as a result of each alternative. In general, road location, construction measures, drainage structures, and timber harvest will have a minimal effect on the natural or beneficial values of the floodplains.

Table 3-39

Roads and Timber Harvest on Floodplains

	Alternatives			
	1	2	3	4
Miles of Road	0	2.2	2.7	2.4
Acres of Harvest	0	27	48	40

Source: Kissinger, 1992

Cumulative Effects

Cumulative or long-term impacts to soil productivity are expected to be negligible if soil quality standards (SQS) are met. Based on monitoring results in the study area, all alternatives are expected to meet or exceed established soil quality standards. If the result of monitoring indicates that some forest practices result in exceeding the SQSs, these practices will be modified or discontinued. The cumulative impacts of soil disturbance or erosion to associated resources such as water quality or fish habitat is discussed in those sections.

Subsistence



Affected Environment

In 1980, with the passage of ANILCA, Congress formally recognized the importance of subsistence resources to the rural communities throughout Alaska.

ANILCA (16 USC 3113) defines subsistence uses as:

The customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; and for customary trade.

Congress declared that "the continuation of the opportunity for subsistence uses by rural residents of Alaska, including both Natives and non-Natives, on the public lands and by Alaska Natives on Native lands is essential to Native physical, economic, traditional, and cultural existence and to non-Native physical, economic, traditional, and social existence". It also stated, in part, under Section 804:

"Except as otherwise provided in this act and other Federal laws, the taking on public lands of fish and wildlife for nonwasteful subsistence uses shall be accorded priority over the taking on such lands of fish and wildlife for other purposes."

On July 1, 1990, the Federal government assumed subsistence management of fish and wildlife on Federal public lands. The Federal Subsistence Board is the governing body charged with the responsibility for regulation and allocation of subsistence uses of fish and wildlife. The taking of fish and wildlife on Alaska federal public lands for subsistence is restricted to residents of rural areas or communities. Other individuals, including Alaskans who are residents of non-rural areas or communities, are prohibited from taking fish and wildlife on federal public lands for subsistence uses.

Most of the rural communities of southeastern Alaska rely on renewable natural resources for at least a portion of their subsistence needs. About one-third of the rural communities of the region take at least half of their meat and fish by hunting and fishing (Holleman and Kruse, 1991). These, and other natural resources are much sought after food items by these residents, regardless of their social status or income levels. Some of the major resources used for subsistence are deer, salmon, moose, trout, halibut, crab, clams, berries, and waterfowl (Kruse and Muth, 1990).

In many rural communities, subsistence activities represent a major part in the seasonal activities of the region's residents. These resource gathering activities include such things as hunting, fishing, digging for clams, catching shellfish, gathering firewood, and collecting

food items from berries to herring eggs. It also means giving, receiving, and trading subsistence items.

The hunting and collecting of resources used for subsistence plays an important role in the lives of the region's rural residents. It reflects deeply held beliefs, values, and attitudes. Many of these subsistence gathering activities become social events for families and communities. Historical resource utilization patterns, such as the Native fish camps or communal deer hunts, are linked to traditional social and subsistence use patterns.



Sharing of subsistence resources is not only important for families and communities, but for relatives and friends in other parts of the region. This sharing can also mean providing resources for families unable to participate in this seasonal activity. It may also mean allowing access to resources not available in all communities. Sharing of resources occurs between communities, as well as within communities throughout the region.

The importance of subsistence may or may not be indicated by average per capita income. Individuals with low income levels may be more dependent on subsistence resources, while individuals with higher income levels may be in a position to combine their subsistence gathering with their ability to buy their food items. It should be noted that income levels do not necessarily equate with an individual's or families' abilities or willingness to participate in the gathering and sharing of subsistence resources. It has been suggested that despite income levels, subsistence harvest activities continue. In fact, the data indicates that "higher incomes are associated with increased harvest" (Kruse and Muth, 1990).

Historical Tlingit Clan Hunting Boundaries

Various authors have made attempts at drawing boundary lines for Tlingit territory. One of the first to mention the Tlingit is the geographer Aurel Krause (1956). Krause did not well define the boundaries between the Tlingit, and neighboring groups.

Albert P. Niblack (1970), an ensign in the U.S. Navy, spent the years 1885 and 1887 observing the Native cultures during his tour of duty in southeast Alaska. He provided an early delineation of the Tlingit territory.

Walter Goldschmidt and Theodore Haas (1946) performed extensive ethnographic field research in southeastern Alaska. Based on their work, it appears that virtually every bay and stream was utilized for the subsistence taking of natural resources. The authors identified land use patterns associated with southeast Alaska Native communities which existed in the mid-19th century. A comparison of their maps, those from the 1987 TRUCS maps, and ADF&G Subsistence Division maps, indicates that hunting and fishing patterns by Natives in southeast Alaska are still tied, to a limited extent, with historical traditions of land and resource exploitation. Regardless of technological innovations that allow residents the option of ranging over a much wider area, their use is still somewhat focused on traditionally claimed areas or boundaries recognized prior to the arrival of Euro-americans. On the other hand, the non-Native harvesters use patterns tend to be more opportunistic and often widely dispersed throughout the region.



Communities With Subsistence Uses Within The Project Area

Subsistence is a complex and evolving issue which encompasses many different and varied aspects of human use of natural resources. In attempting to meet the subsistence needs of the various users of the North and East Kuiu Island area, the Forest Service, in consultation with the ADF&G-Subsistence Division, has determined which communities should be considered in this subsistence analysis. A wide range of information was consulted in making the determination. The data from the 1987 TRUCS mapping effort, as well as recent ADF&G deer harvest information, were consulted in the process of identification of communities using the project area for subsistence.

Based on information derived from the TRUCS effort and other sources, the following communities have harvested subsistence resources from the project area: Kake, Klawock, Petersburg, Point Baker, Port Protection, Port Alexander, Sitka, and Wrangell. All have been determined to be rural by the Federal Subsistence Board.

The project area has been closed to deer hunting since 1975. None of the communities appear to be wholly dependent on the project area for subsistence resources, and more particularly deer harvest. Kake is the closest community to the project area, and claims traditional aboriginal use rights to much of the project area.

Important Subsistence Use Areas

Much of the beach fringe within the project area boundary, has been identified as having been used for subsistence resource gathering activities. This coastal area or beach fringe has been identified in the TLMP Revision as the area of land generally located at 500-foot slope distance inland from the mean high tide along the coastline. Based on the TRUCS maps, the important use areas may be located from 3 to 6 miles from the coastline.

Traditionally, the Kupreanof and Kuiu Islands area has been an important deer harvest area. During the winter of 1975, both islands were closed by the Alaska Board of Game to the taking of deer for subsistence or sport hunting. The closure has remained in effect since that date.

Historically, important use areas for many of the communities hunting for deer include Security, Saginaw, and Kadake Bays; Rowan Bay, Bay of Pillars, and the mouth of Port Camden to the southern coast of Port Beauclerc. The estuaries found within these bays also provide important habitat for waterfowl; the tidally exposed sediments provide important shellfish habitat; and many of the bays have important salmon runs which support the abundant wildlife resources.



Kuiu Island has ~~to~~ been closed to deer hunting since 1975.

Maps in Appendix B depict the individual community deer harvest areas. The information is displayed for the project area by specific resource: deer, marine mammals, marine invertebrates, other finfish, and salmon. This mapped data is based on the TRUCS effort.

Table 3-40

Demographic Data on Communities Identified as Using the Project Area

Community	1990 Population	% of Population that is Alaska Native	1987 Per Capita Income
Kake	700	73	9,057
Klawock	722	38	8,595
Petersburg	3,207	10	12,602
Point Baker	39	3	6,212
Port Protection	62	2	5,912
Port Alexander	119	5	6,343
Sitka	8,588	21	14,572
Wrangell	2,635	20	11,989

Source: U.S. Department of Commerce, Bureau of the Census, 1990, Kruse and Frazier, 1988



Subsistence Use By Community

The following text refers to a series of tables and figures related to community specific subsistence use for the project area. Table 3-40 depicts population data on communities identified as using the area. This representation reveals the context of subsistence use. Figure 3-2 shows the pounds of edible subsistence harvest per capita by community. Table 3-41 indicates the mean per capita pounds of subsistence harvest by type of harvest for communities utilizing the project area.

The communities of Juneau and Ketchikan are non-rural. These communities were not studied during the TRUCS effort.

The 1987 TRUCS effort was directed by the Institute of Social and Economic Research, University of Alaska-Anchorage, and jointly carried out by the Forest Service, ADF&G-Subsistence Division, and the Institute (Kruse and Frazier, 1988). All the figures displayed in this subsistence determination are based on a sampling of community households surveyed. It is possible that actual amounts harvested could be higher or lower than reported by the TRUCS sampled community households.

Figure 3-2

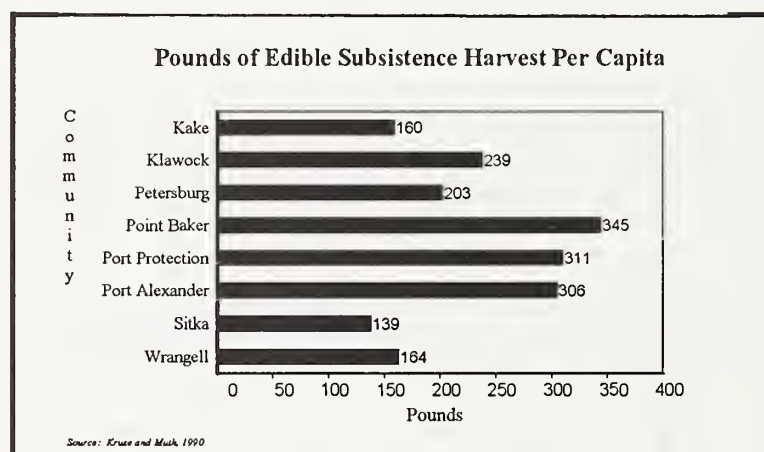


Figure 3-3

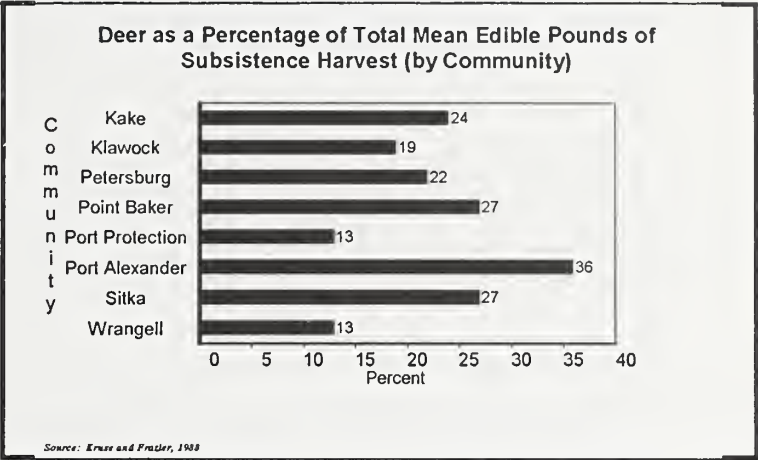


Table 3-41

Mean Per Capita Edible Pounds Harvested in 1987

Community	Deer Harvest (lbs.)	Other Mammals (lbs.)	Salmon Harvest (lbs.)	Finfish/Shellfish (lbs.)	Other Harvest (lbs.)	Mean Total Harvest (lbs.)
Kake	129	0	117	161	38	160
Klawock	159	0	265	353	21	239
Petersburg	44	0	45	76	7	203
Point Baker	173	0	164	214	31	345
Port Protection	86	0	241	298	32	311
Port Alexander	321	0	202	286	67	306
Sitka	106	2	108	158	11	139
Wrangell	57	13	85	161	9	164

Source: Kruse and Frazier, 1988; Charles Smythe, 1988; Katherine Cohen, 1989

Kake

The community of Kake is located along the northwest coast of the island of Kupreanof about nine miles by water from the project area. The 1990 US Census reported a population of 700, with seventy-three percent being Native American. Per capita income of Kake residents in 1987 was reported to be \$9,057 (Kruse and Frazier, 1988).



Kake was one of the many camps and villages occupied by the Tlingit during the late 18th and early 19th centuries along this rocky perimeter of Kupreanof Island. These camps and villages eventually consolidated into the area of the present day community. Its original name was "S'ikanakhse", which is said to mean "from a black bear town". Additional interpretations include "town that never sleeps", and "black bird on the rock" (Firman and Bosworth, 1990). The Kake people, like other Tlingit of the region, are heavily dependent on the sea for their livelihood. The Kake people were introduced to a succession of missionary groups not long after western colonization. With that physical presence, the Kake people witnessed a succession of changes to the physical and cultural landscape. A school and store were built in 1891, and a cannery was constructed in 1912. According to Lonnie Anderson, Mayor of Kake, a cold storage plant, owned by Kake Tribal Corporation, was built in 1980 and has operated sporadically since that time. Logging operations commenced in the 1940's, and have largely been restricted to what are now Kake Tribal Corporation lands. Employment within the community is largely seasonal, with fishing and fish processing, transportation, communications, and education incorporating the major economic sectors. A high relative percentage of the population depends on the subsistence taking of fish and wildlife.

According to the TRUCS survey, the community harvested a total of 160 pounds per capita of subsistence resources (Kruse and Frazier, 1988). Kake averages 22 percent of its fish and wildlife from subsistence according to the 1987 survey. Deer makes up 24 percent of the total subsistence harvest.

A map in Appendix B displays TRUCS data showing where people from Kake harvest deer, and indicates which areas are more reliable and most often used for deer hunting purposes. Presently, the majority of the community deer harvest comes from the southern coast of Admiralty Island. No deer harvest has been reported/recorded for the community for any WAAs within the study area between 1975 and the present. It should be noted that the study area has been officially closed to deer harvest since 1975 due to a number of factors (i.e., weather and predation).

Klawock

Klawock is situated along the west coast of Prince of Wales Island, approximately 5 miles north of Craig, Alaska (Orth, 1967). Klawock is located approximately 55 air miles south of the project area. The 1990 US Census lists the total population for the community at 722 individuals. Per capita income for the community based on the 1987 TRUCS project totalled \$8,595. Kruse and Frazier (1988) note that 38% of the community is comprised of Alaska Natives.

In 1779, the Spanish explorer Don Ignacio Arteago's expedition reportedly anchored near what would eventually be referred to as the Klawock area; Arteago called it "la Galere". The Tlingit village name for the area was noted in 1853 on the Russian Hydrographic Department Chart No. 1493, as "Klyakkhan settlement", on the west side of Shinaku Inlet. Orth (1971) suggests that this may have been the location for the village prior to the establishment of the cannery at the present site in 1878. At least two different names for the community were suggested or referred to during the intervening years. It wasn't until 1890, and

the U.S. Census, that the name Klawock officially appears. The first saltery and trading post appeared in 1868, and the first Alaskan cannery was built in 1878. Subsequently, more canneries and a sawmill were installed by 1920. In 1971, a new sawmill was constructed and, by 1991, the enterprise had closed its doors. Employment in the community is largely seasonal.



In 1987, the community harvested a total of 239 pounds per capita of subsistence resources. Based on that total, deer and salmon made up for over 50% of the harvest. Deer alone comprise 19% of the total per capita harvest. Klawock hunters travel as much as 40 miles to their more reliable hunting areas, and they are less likely to hunt in alpine or open beaches (Kruse and Frazier, 1988).

Appendix B maps display TRUCS data showing where the community of Klawock harvests deer, and which areas are the most reliable and most often used for deer harvest. The majority of Klawock's deer harvest appears to come from nearby areas (e.g. WAA 1105, 1107, 1213, 1214, and 1216). Klawock's residents did not report any deer harvest with ADF&G for the project area WAAs for the years 1987 through 1991.

Petersburg

Located in the approximate center of southeast Alaska, Petersburg is situated along the northern coast of Mitkof Island at the northern terminus of the Wrangell Narrows. It is located approximately 35 air miles east of the project area. Population for the community in the 1990 US Census was set at 3,207 individuals. Eleven percent of the population is Native American (Smythe, 1988). Per capita income for the community in 1987 was reported at \$12,602 (Kruse and Frazier, 1988).

Petersburg was founded by Norwegian immigrants in 1899, and incorporated in 1906 as a community. The community continues a distinctly Scandinavian flavor up to the present time. Petersburg grew up around a cannery and sawmill, and quickly became one of the regional centers for fishing, processing, and transportation. Population figures indicate a gradual, and for the most part, consistent growth rate for the community throughout the years. The economic base for the community remains in the fish processing and manufacturing sectors; local, state, and federal government is the next leading employer. Fishing, tourism, retail trade, construction, and timber make up several other components of the local economy. Employment is largely seasonal.

Petersburg's residents utilize the full range of subsistence resources available to them. Per capita harvest of subsistence resources for the community in 1987 was reported at 203 pounds. The average household in 1987 gleaned 31 percent of its fish and meat from subsistence sources (Smythe, 1988). Deer made up nearly 22 percent of the total community harvest (Smythe, 1988).

Deer harvest for the community is very dispersed throughout the region. Petersburg's deer harvest patterns during historical times to the recent past can be characterized as largely opportunistic. General harvest areas utilized by the community for the harvest of deer appear to focus on the Peril Strait/Tenakee Inlet areas of Chichagof/Baronof Islands; the southern

portion of Admiralty Island; and the northeastern portion of Prince of Wales Island. Appendix B displays important historical subsistence use areas within the project area identified by Petersburg residents during the TRUCS project of 1987-88.



Point Baker and Port Protection

Point Baker and Port Protection are located along the northwestern coast of Prince of Wales Island. The two communities are geographically separated, but share fairly common histories, services, economies, and subsistence uses. They are located approximately 12 air miles southeast of the project area. The 1990 US Census lists the population for the two communities as 39 and 62 respectively. Both are respectively populated with 3% and 2% Native Americans. Per capita income for the two communities in 1987 was \$6,212 and \$5,912 (Kruse and Frazier, 1988).

The first floating fish packer came to Point Baker to purchase fish caught by local fisherpersons in 1919, but the area was not officially settled until the 1930's when the Forest Service opened the area to home site selection. A post office and stores opened for business during the 1930's and 1940's. Both communities grew as increasing numbers of hand and power trollers used the area as a home base. Additionally, the State of Alaska sold parcels of land through their land sale program during the 1970's and 1980's, resulting in the building of homes, warehouses, and other structures by the old and new residents of these communities. Students attend the combined grade/high school in Port Protection. The local economy is based on fishing, primarily trolling and gill-netting.

Residents of the two communities harvest a wide variety of subsistence resources. Based on the 1987 TRUCS information, the respective communities harvest 345 and 311 pounds per capita. This amounts to 173 and 86 pounds of edible deer, 164 and 241 pounds of salmon, 124 and 197 pounds of other finfish, and 90 and 101 pounds of shellfish. The average household in the two communities derived at least 50% of their meat and fish from subsistence activities in 1987.

The residents of Point Baker and Port Protection identified the beach fringe and inland from Three Mile Arm to Reid Bay as historical deer use areas. Maps in Appendix B display important historical subsistence use areas within the project area identified by Point Baker and Port Protection residents during the TRUCS project of 1987.

Port Alexander

Port Alexander is located along the southeastern coast of Baranof Island, approximately 25 air miles southwest of the project area boundary. The 1990 US Census lists the population for the community as 119. Five percent of the population is Alaska Native. Per capita income of Port Alexander residents in 1987 was reported as \$6,343.

In 1795, Captain George Vancouver entered what would later become known as Port Alexander. Vancouver noted what he thought was an abandoned Tlingit village there. Fifty-five years later the Governor of the Russian American Company visited the area and is credited with naming the locality Port Alexander.

The safe anchorage and proximity to the abundant fishing grounds of Chatham Strait led to fisherpersons utilizing Port Alexander as a seasonal base. Along with this marine use came commercial development of the uplands. By 1916, developments included a salmon cannery, store, and bakery. Following that, a fish buyer, fuel dock, radio telephone station, restaurant, general store, warehouse, and butcher shop were added. During the 1930's, Port Alexander was known as the center of the trolling fleet, and boasted a population of over 100 individuals (Orth 1967). With the decline in herring and salmon stocks, and the Second World War, population in the community began a spiralling decline. The decline bottomed out in 1960 at 18 residents.



The annual harvest of subsistence resources was about 331 pounds per capita in 1987. Mean edible pounds consisted of 321 pounds of deer, 5 pounds of black bear, 202 pounds of salmon, 206 pounds of other finfish, 80 pounds of shellfish, 25 pounds of beach greens, and 31 pounds of berries. Deer constituted 36% of the total harvest (Kruse and Frazier, 1988).

Historical use patterns for the community indicate a preference for the northwestern coast of Kuiu Island (i.e., Rowan to Washington Bays), as well as the east coast from Camden to Reid Bays. Up to 5 Port Alexander households use this area for subsistence.

A map in Appendix B displays TRUCS data showing where Port Alexander residents historically harvest deer. According to ADF&G, the community reported no deer harvest in the project area between 1987 and 1991.

Sitka

The community of Sitka is situated along the west coast of Baranof Island, approximately 40 air miles north and west of the project area. The 1990 US census reports a population of 8,588. Eighteen percent of the population is Alaska Native. Per capita income for the community in 1987 was reported to be \$14,572 (Kruse and Frazier, 1988).

Sitka has been occupied since time immemorial. The Tlingit Indians of southeast Alaska claim the area, and have numerous oral histories concerning their occupation and use of the region's natural resources. Sitka became the center for the fur trade along the northwestern Pacific coast beginning in 1741. It was the Russian American capital until the United States purchase of Alaska in 1867. Sitka served as the Alaska territorial capital from 1884 to 1906, when the state capital was moved to Juneau. Following the fur trade, the community shifted rapidly to fishing and fish processing. With World War II came another shift to a more diverse economy. Presently, the Sitka economy is based on wood pulp manufacturing, as well as education, tourism, government, commercial fishing, retail trade, construction, and community services. A number of these occupations are largely seasonal.

Residents of Sitka harvest a wide variety of natural resources which include deer, moose, goat, black bear, seal, salmon, shellfish, and waterfowl. The annual harvest of subsistence resources in 1987 was reported as 139 pounds per capita for the community. Deer made up 27% of the harvest, along with 28% for salmon, 25% for other finfish, 16% for shellfish, and 6% for marine mammals and other resources.



Sitka residents identified historical use patterns for deer during the 1987-88 TRUCS effort. Coastal use is indicated from Rowan to Kadake Bays, as well as a small area at the head of Port Camden (Appendix B). ADF&G reports that the community did not harvest deer from the project area between 1987 and 1991.

Wrangell

The community of Wrangell is situated along the northern limits of Wrangell Island, some 60 air miles south and east of the project area. The 1990 US Census reported a population of 2,479. Thirty eight percent of the population is Alaska Native. Per capita income for the community in 1987 was listed as \$11,989 (Kruse and Frazier, 1988).

Proximity to the Stikine River and its resources made the location a key to the control of commerce and trade from time immemorial. The Stikine is one of only few major river systems which breach the coastal mountains and flow into salt water, thus providing ready access to and from the Canadian interior. Native peoples of Alaska and Canada have oral histories related to early use of this waterway well before the arrival of the white man (Cohen, 1989).

The Russians were the first non-Natives to establish a fort at Wrangell, followed by the British and Americans. Later the community served as the jumping off point for a succession of gold rushes into the Canadian interior. As a result, the community has experienced a series of boom and bust cycles which adversely affected the local population and economy. During this time, a sawmill and two canneries were established. Presently, the community's economy is dominated by wood processing, commercial fishing, education, community services, retail trade, and government.

Wrangell residents hunt for moose, deer, goat, black bear, and waterfowl. They also fish for salmon, halibut, shellfish, and other finfish. In 1987, the annual subsistence harvest of resources was 164 pounds per capita (Kruse and Frazier, 1988). This accounts for an average of 130.6 pounds of useable meat harvested by hunting, and 25.6 pounds from gathering (Cohen, 1989). Mean useable weight accounted for 57.2 pounds for deer, 34.6 pounds for moose, 19.6 pounds for seal, 8.3 pounds for black bear, 6.2 pounds for birds, and 4.5 pounds for goats (Cohen, 1989). Deer made up 13% of the subsistence meat harvested by Wrangell residents during 1987.

Environmental Effects

ANILCA Section 810 Subsistence Evaluation Process

Section 810 of ANILCA requires a Federal agency, having jurisdiction over public lands in Alaska, to evaluate the potential effects of proposed land-use activities on subsistence uses and needs. Section 810 of ANILCA states:

"In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the Federal agency having primary jurisdiction over such lands or his designee shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be effected until the head of such Federal agency:



- (1) gives notice to the appropriate State agency and the appropriate local committees and regional councils established pursuant to Section 805;
- (2) gives notice of, and holds, a hearing in the vicinity of the area involved; and
- (3) determines that (A) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands; (B) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition; and (C) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources from such action."

Earlier information dealt with current and historical subsistence uses on the North and East Kuiu Island project area by the rural residents of the communities of Kake, Klawock, Petersburg, Point Baker, Port Protection, Port Alexander, Sitka, and Wrangell. This segment evaluates how the various project alternatives could affect subsistence uses by the above communities in the project area. Deer, wildlife, fish, other foods, and timber are the resources used for subsistence that are evaluated in this document.

Evaluation criteria used to assess the effects of the alternatives are: (1) changes in abundance or distribution of subsistence resources, (2) changes in access to subsistence resources, and (3) changes in competition from non-subsistence users for those resources. The evaluation determines whether subsistence uses within the analysis area or portions of the area may be significantly restricted by any of the proposed action alternatives. To determine this, the evaluation: (1) considers the availability of resources used for subsistence in the surrounding areas; (2) considers the cumulative impacts of past and foreseeable future activities on subsistence users and resources; (3) looks at potential cultural and socioeconomic implications affecting subsistence users; and (4) focuses on the mapped subsistence use areas by communities with documented subsistence use within the study area.

The evaluation relies heavily upon wildlife habitat capability models developed in support of the TLMP Revision and displayed in sections K and L of the Appendix (Volume 1) to the 1991 Supplement to the Draft EIS for the Tongass Land Management Plan Revision.

FEIS Evaluation

The FEIS Subsistence Evaluation for Kuiu Island focuses on the renewable natural resources, and the rural communities that use the study area for subsistence purposes. The in-



tent of the evaluation is to find out whether any proposed alternative "may" significantly restrict subsistence uses within the analysis area. The Findings are based on whether: (1) the proposed alternatives would have a measured effect on subsistence users for each of the categories evaluated; (2) the foreseeable timber harvest schedule prescribed in the Supplement to the Draft EIS for the Tongass Land Management Plan Revision poses enough potential for affecting subsistence uses to substantiate a finding of "may" restrict subsistence use.

The Supplement to the DEIS for the Tongass Land Management Plan Revision broadly addresses the availability of other lands suitable for the purpose of subsistence use. (See discussion in Chapter 3-757; Areas Eliminated from Detailed Study 1981-86 EIS; Alternatives Eliminated from Detailed Study in 1986-90 EIS, and Final SEIS). The selection of the project area in this analysis is detailed in Appendix F.

FEIS Findings

Using the information gathered from the Tongass Resource Use Cooperative Survey (TRUCS), comments from ANILCA 810 Subsistence Hearings, and other relevant cultural and socioeconomic sources, the Forest Service makes distinct Findings by alternative and by resource category, whether there may be a significant restriction of subsistence use. The resource categories evaluated are deer, wildlife, fish, other foods, and timber. Because of its regional significance as a resource used for subsistence, deer are evaluated separately. As indicated earlier, the evaluation considers the effects by alternative on (1) abundance or distribution, (2) access, and (3) competition for each resource category.

The Alaska Land Use Council's definition of "significantly restrict subsistence use" is one guideline used in the Findings. By this definition:

A proposed action shall be considered to significantly restrict subsistence uses, if after any modification warranted by consideration of alternatives, conditions, or stipulations, it can be expected to result in a substantial reduction in the opportunity to continue subsistence uses of renewable resources. Reductions in the opportunity to continue subsistence uses generally are caused by: reduction in abundance of, or major redistribution of resources; substantial interference with access; or major increases in the use of those resources by nonrural residents. The responsible line officer must be sensitive to localized, individual restrictions created by any action and make his/her decision after a reasonable analysis of the information available.

The U.S. District Court Decision in *Kunaknana vs. Watt* provided additional definitions of "significant restriction of subsistence uses" and are also used as guidelines in the Findings. The definitions from this decision of record are as follows:

Significant restrictions are differentiated from insignificant restrictions by a process assessing whether the action undertaken will have no slight effect as opposed to large or substantial effects. In further explanation the Director (BLM) states that no significant restriction results when there would be "no or slight"

reduction in the abundance of harvestable resources and no "occasional" redistribution of these resources.

There would be no effect (or slight inconvenience) on the ability of harvesters to reach and use active subsistence harvesting sites; and there would be no substantial increase in competition for harvestable resources (that is, no substantial increase in hunting by non-rural residents).



Conversely, restrictions for subsistence uses would be significant if there were large reductions in the abundance of the major distribution of these resources, substantial interference with harvestable access to active subsistence sites or major increases in...(non-rural) resident hunting.

In light of this definition the determination of significant restriction must be made on a reasonable basis, since it must be decided in light of the total subsistence lands and resources that are available to individuals in surrounding areas living a subsistence lifestyle.

The FEIS also evaluates the availability of resources used for subsistence in surrounding areas that could be accessed without undue risk or economic hardship to subsistence users.

Subsistence Use Area

All the VCUs in the Kuiu Island study area are used for subsistence. However, specific areas within these VCUs have been identified as potentially more important for the harvesting of resources used for subsistence (see the TRUCS- based Subsistence Use Maps, Appendix B). Many of the proposed timber harvest units are within mapped subsistence-use areas. Table 3-42 lists these harvest units by alternative. The locations of the proposed units, found in the alternative maps, are considered in the Evaluation and the Findings.

The rural communities utilizing the subsistence use areas in the vicinity of Kuiu Island harvest a variety of wildlife resources. The 1987 Tongass Resource Use Cooperative Survey (TRUCS) found that wildlife made up 22 to 53 percent of the per-capita harvest of principal resources used by the rural communities utilizing the study area. The pounds per capita ranged from 139 pounds for Sitka to 345 pounds in Point Baker.



Table 3-42

Proposed Timber Harvest Units in Subsistence Use Areas¹

VCU	Alternative		
	Alt 2	Alt 3	Alt 4
398			
399	13, 16, 17, 18, 19, 20, 21, 22		13, 16, 17, 18, 19, 20, 21, 22
400	18, 20, 13, 15	15, 18, 20,	13, 15, 18, 20
401			
402	23, 24, 25, 26, 27, 28, 29, 30, 34, 35, 49	23, 24, 25, 26, 27, 28, 29, 30, 49	23, 24, 25, 26, 27, 28, 29, 30, 34, 35, 49
416		3, 4, 5, 6, 7, 8, 13, 14, 15, 16, 19, 20, 21, 22, 28, 30, 31	3, 4, 5, 6, 7, 8
417		1, 2, 3, 4, 5, 6, 7, 8, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24
418		1, 2, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16	1, 2, 4, 5, 6, 7, 10, 11, 12, 13, 14, 15, 16
419	1, 2, 3, 4, 5, 27, 28, 29, 30	1, 2, 3, 4, 5, 27, 28, 29, 30	27, 28, 29, 30
420	15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 45, 46, 47, 48	16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 49	45, 46, 47, 48
421			

Source: Roberts, 1992

¹ Refer to alternative maps and the Community Subsistence Use Maps in Appendix B.

Deer Effects and Evaluation

Abundance and Distribution of Deer

The evaluation of deer is based on a comparison of supply and demand. The habitat capability model for deer (see the wildlife section of this chapter) provides an estimate of the potential number of deer available for harvest within the project area over time. This equates to a supply available for subsistence use. This potential amount available for subsistence use can be compared with historical harvest data, or demand, for deer. If the demand for deer exceeds the supply, then a significant possibility of a restriction exists.



It is assumed that communities with historical use of the study area for subsistence resources will continue to do so in the foreseeable future if the area is opened for deer hunting. In 1960, census data for these communities (i.e., Kake, Klawock, Petersburg, Port Alexander, Sitka, and Wrangell) total 6778. Apparently census data was not reported for the communities of Point Baker and Port Protection for that year. Because these two communities were not statistically represented in this early data, they were not included in the extrapolation of population data through the year 2040.

Hunter population, it is assumed, equals census data for the above communities. Their populations are expected to increase and compound over time.

Alaska Department of Fish and Game (1991) estimates "An average of approximately 200 deer were killed on Kuiu annually in the 1960's". It is assumed that this (i.e., 200 deer) represents 100% of the subsistence demand, in 1960, for deer on Kuiu Island by the above communities. It is evident from Table 3-43 that several rural communities harvest deer and have utilized the study area to a greater extent than the other communities in this analysis.

The following figures are based on information which portray traditional subsistence use areas for the taking of deer (Alaska Department of Fish and Game, 1991; Bureau of the Census, 1990; Wilson and Roberts, 1991). Total deer harvest demand by WAA is projected for the study area. The figures indicate that WAAs 5014 and 5018 may not meet the projected hunter demand in the foreseeable future. Assumptions made to complete the analysis can be found in the footnote of Figure 3-7. Figures 3-4 through 3-7 display the effects of implementation of the preferred alternative (Alternative 4) by WAA. Assumptions made to complete the analysis can be found in the footnote of Figure 3-7.



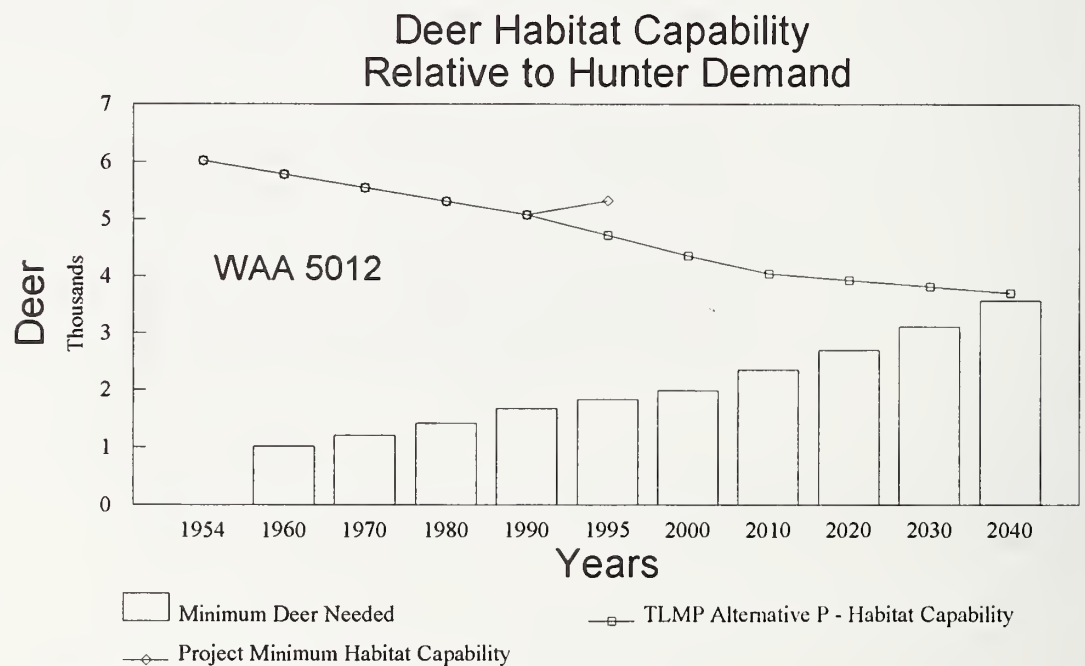
Table 3-43

Total Acres Used Within the Study Area by Community

Community	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Kake	62,523	2,250	1,863	1,692
Klawock	15,991	309	80	229
Petersburg	1,250	25	25	25
Point Baker	30,668	0	630	1,877
Port Protection	45,096	649	2,637	2,246
Port Alexander	56,700	2,473	3,762	1,403
Sitka	12,142	251	66	298
Wrangell	69,250	1,294	3,284	2,874

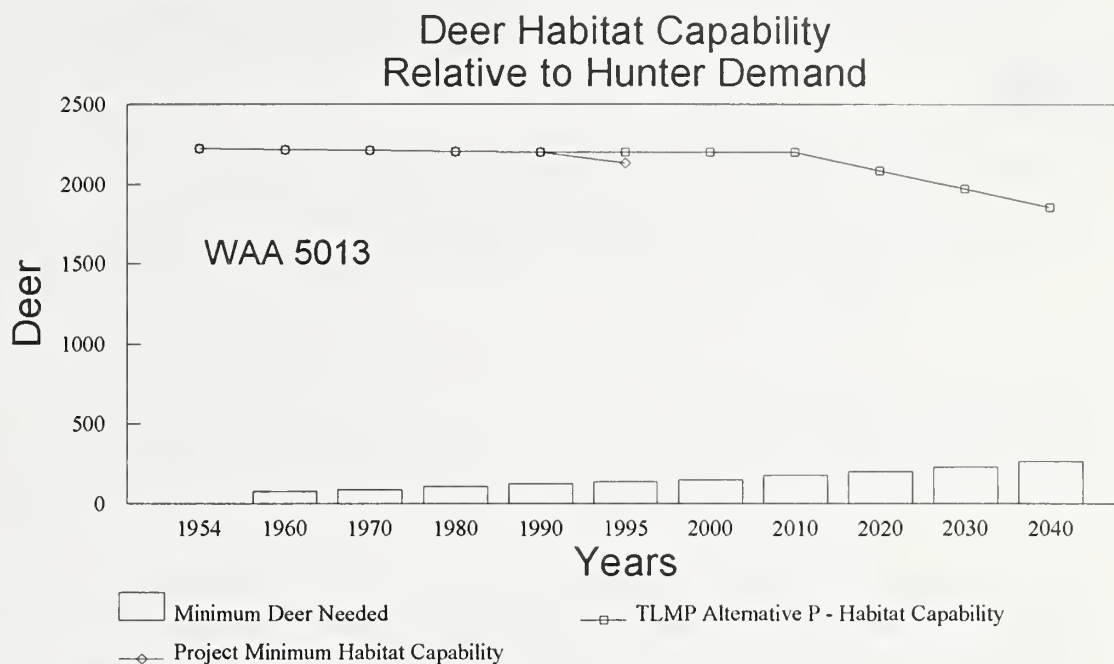
Source: Wilson and Roberts, 1991

Figure 3-4



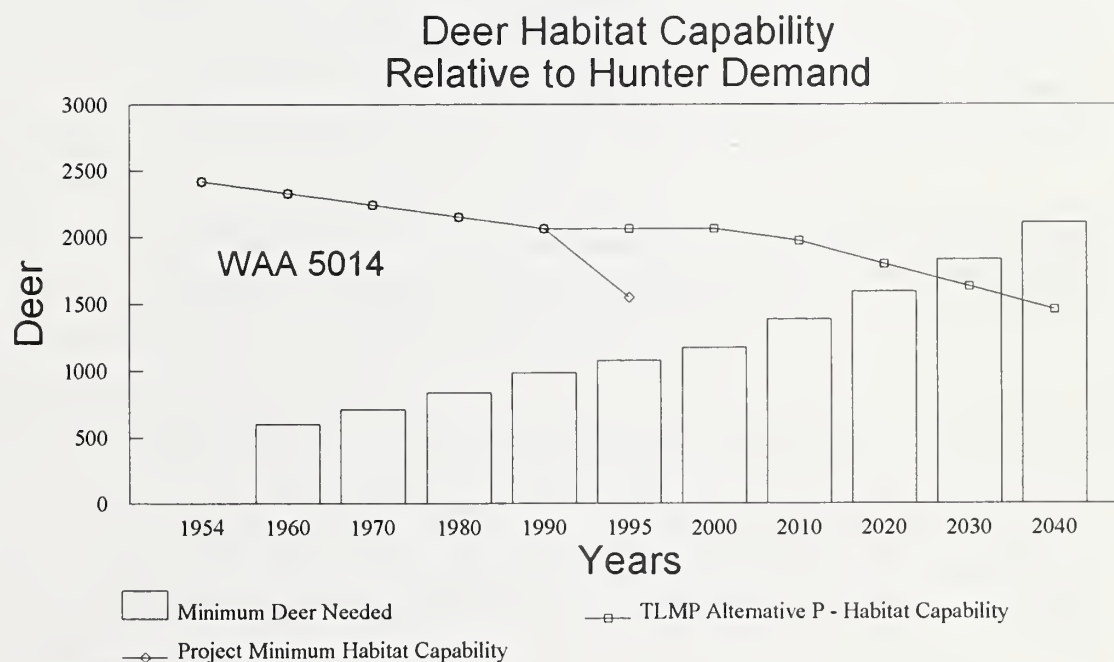
For assumptions see notes following figure 3-7

Figure 3-5



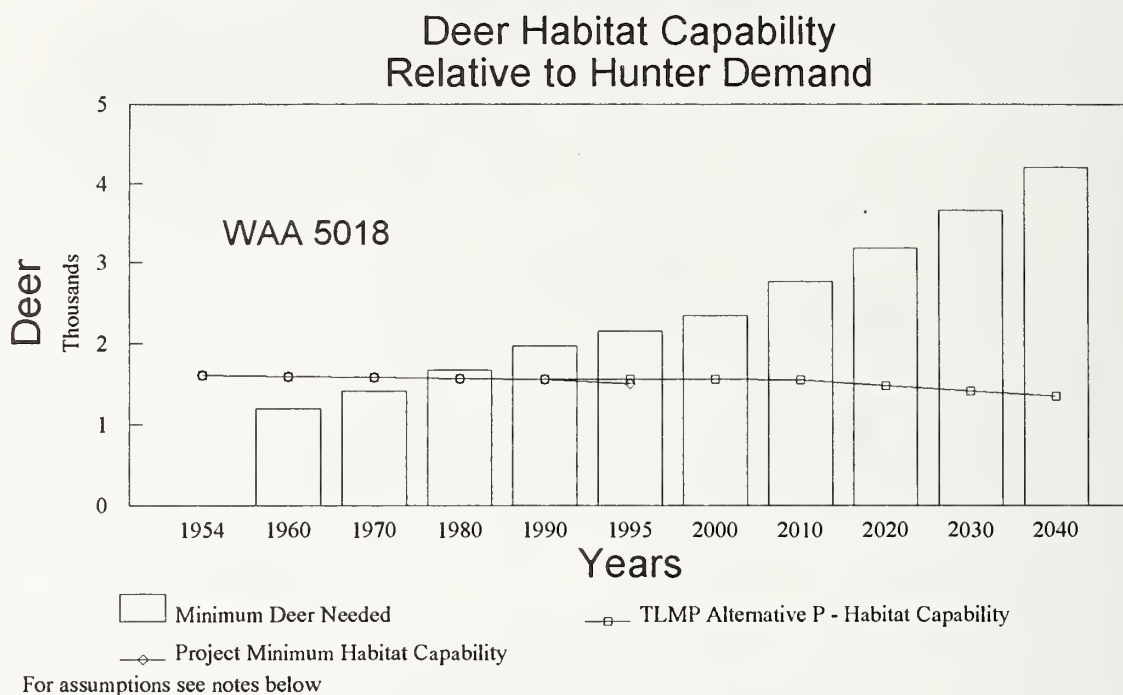
For assumptions see notes following figure 3-7

Figure 3-6



For assumptions see notes following figure 3-7

Figure 3-7



Assumptions for Figures 3-4 through 3-7 (Suring et al, 1991):

- The Habitat Capability model for the years 1954, 1990, 2000, 2010, and 2040 were from the TLMP Revision, 1991, Alternative P. For the points in 2020 and 2030, a linear relationship was assumed. The data point for 1995 is from the wildlife section of this document for the alternative with the lowest carrying capacity in the WAA.
- Hunter Demand is from Strategic Management Plan for Deer, ADF&G, 1991. For decades 1990-2010 and 2010-2040, TLMP Revision assumed 18% and 15% per decade respectively for population increase. Hunter demand was assumed to increase at the same rates.
- Minimum deer needed is assumed to be 10 times hunter demand, ADF&G, 1991.
- Assume 1960 data for hunter demand was 100% subsistence.
- Assume rural residents harvest deer in 90% of the same areas as historically used.
- This analysis was for the communities of Kake, Klawock, Petersburg, Port Alexander, Sitka, and Wrangell. Population data was not incorporated in the 1960 census for Point Baker and Port Protection, therefore, they are not included in this analysis.

Access to Deer

Access to historical subsistence use areas has not been affected by land use activities and is not expected to be effected by any of the action alternatives. Likewise, projected effects in the foreseeable future are not expected to change based on this subsistence analysis. This conclusion is based on traditional means of access (i.e., foot, boat, and float-plane).



The developed road system allows seasonal access to much of north and east Kuiu Island. These existing and proposed roads will increase access to areas traditionally used for subsistence deer hunting. Presently, the only means of motor vehicle access to the island is by boat or barge. The Alaska Marine Highway System does not serve the island and is not expected to do so in the foreseeable future.

Competition for Deer

The subsistence and sport harvest of deer remains closed on Kuiu Island. There is some indication that the island can support a limited deer harvest. Both ADF&G and the Federal Subsistence Board have received 1993-94 seasons and bag limit proposals for a Kuiu Island deer harvest.

Competition is not expected to increase for deer on Kuiu Island. All of the communities analyzed with historical subsistence use of deer on Kuiu Island have been determined rural by the Federal Subsistence Board. This qualifies them for subsistence harvest should the island be opened to harvest in the future. The Federal Subsistence Board has the authority to restrict the subsistence and sport harvest of deer.

Deer Findings

Deer are an important subsistence resource utilized by all the rural communities with documented use in the vicinity of Kuiu Island. The 1987 TRUCS Community Reports indicate that deer provide about 19 to 36 percent of the per-capita harvest of principle subsistence resources harvested by subsistence users in and around the study area. The per-capita harvest of deer ranged from 139 pounds by Sitka residents to 345 pounds for Point Baker residents.

As noted earlier, the Alaska Board of Game has not allowed subsistence or sport hunting of deer within the north and western portions of GMU-3 (Game Management Unit) since 1975. This restriction encompasses all of Kupreanof and Kuiu Islands. This suggests that subsistence users who have traditionally harvested deer on Kuiu Island prior to the 1975 closure shifted to other more reliable, nearby areas for the harvest of deer.

Proposed timber harvest units being considered within the various alternatives are located within areas documented as having been utilized for deer hunting during the last fifty or more years. The projected effects to deer resulting from harvesting these units are evaluated in the Wildlife section of the FEIS. They are evaluated even though the study area and the surrounding vicinity have been closed to deer hunting. Furthermore, the deer population on Kuiu Island may be returning to a huntable population level. ADF&G, as well as proposals before the Federal Subsistence Board, recommend opening Kuiu island to deer harvest dur-



ing the 1993-94 season. We project that 81 percent of the habitat capability would still remain when the projected foreseeable-future effects on deer habitat are realized (see the wildlife section). Thus, when considering the deer population as being at a huntable level, the projected effects on abundance by the proposed activity would be reduced by up to approximately 2 percent in any action alternative. Changes in local deer herd distribution are also expected to be low to moderate. The deer habitat capability models used in the wildlife section of this FEIS project that past, present, and reasonably foreseeable timber harvest activities have reduced the potential deer habitat capability by 13 percent from 1954 to 1991.

Based on the subsistence and wildlife sections of this analysis it is determined that there is a significant possibility of a significant restriction for abundance or distribution of deer.

Traditionally, local subsistence users have harvested deer in conjunction with other subsistence resource gathering activities, and hunting access was primarily via foot and boat. This mode of access is not expected to change.

Table 3-44

Significant Possibility of a Significant Restriction of Deer ¹

	Alternative			
	1	2	3	4
Abundance or Distribution	Yes	Yes	Yes	Yes
Access	No	No	No	No
Competition	No	No	No	No

Source: Roberts, 1992

¹ "Yes" Indicates there may be a significant restriction and "No" indicates there is no significant possibility of a significant restriction.

Wildlife Effects and Evaluation

Abundance and Distribution of Furbearers

Some trapping occurs on Kuiu Island as indicated by the harvest of furbearers in Alaska Department of Fish and Game Minor Harvest Areas (MHA) on Kuiu Island. Proposed harvest units in various alternatives are located in mapped furbearer-subsistence use areas in Port Camden (VCU 420). Although the trapping areas are few, they are important to the rural communities using the study area.

Furbearers are harvested on Kuiu Island, mainly marten, mink, and river otter during periods of generally high market demand for such pelts. No information is currently available on how many trappers harvest furbearers from Kuiu Island.

The estimated marten habitat capability within the study area in 1954 was set at 850 animals. Projected numbers in 1991 total 760 animals, for an estimated 11 percent reduction.

Most of the proposed developmental activities, however, occur outside of the furbearer-subsistence use areas within the study area. The effects of this project on marten habitat capability are projected to be not more than 3 percent. The potential effects would not significantly add to the past cumulative effects in the study area. The cumulative effects on marten habitat capability are projected to be reduced to 54 percent of their 1961 levels by 2011.



The analysis in the Subsistence section projects effects on furbearer abundance in the furbearer use areas as minimal (see the wildlife section of this chapter). Changes in local furbearer distribution are also projected to be minimal although the foreseeable effects of twenty-five years plus second growth include altering furbearer habitat-use patterns.

Abundance and Distribution of Waterfowl

The action alternatives associated with the study area do not propose to effect wetlands habitat. Based on this analysis there will be no effect on wetlands habitat. Waterfowl abundance and distribution is not expected to change in any alternative (see the wildlife section of this chapter for the effects to the Vancouver Canada Geese).

Abundance and Distribution of Black Bear

Kuiu Island is a popular area for black bear hunting. Black bear harvest has increased since 1981, especially by nonresident (out of state) hunters. People who have testified at ANILCA 810 Hearings at Point Baker attested to the importance of No Name Bay, Seclusion Harbor, and Three Mile Arm for black bear harvest. Specific effects on black bear habitat capability are not expected to adversely effect the population. Projected changes in population for the study area indicate a maximum of 1 percent reduction. The habitat capability model indicates that there is a healthy and abundant black bear population on Kuiu Island. More specifically, black bear populations within the study area are not expected to experience a significant possibility of a significant restriction (see the wildlife section of this chapter) under any alternative.

Abundance and Distribution of Marine Mammals

The Marine Mammal Protection Act (1972) prohibits the taking of marine mammals by anyone other than Alaska Natives. The Act allows Alaska Natives to take marine mammals, so long as it is used for a "subsistence purpose", or to create "authentic Native" handicrafts of clothing, and "is not accomplished in a wasteful manner".

Currently, there is no evidence to suggest that timber harvest and related development activities have any impact on marine mammals. The most likely area for any human/marine mammal interface is within the area of the log transfer facility (LTF). Therefore, there is no significant possibility of a significant restriction to the subsistence use of marine mammals under any alternative.



Access to Wildlife

Access to historic subsistence-use areas has not been affected by past land-use activities and will not be affected by any of the proposed alternatives. Nor is there any projected effects in the foreseeable future due to activities proposed in this analysis. This is because traditional access by foot, boat or float plane would remain the same.

Roads radiating from the logging community of Rowan Bay provide a means of access to more than half of north and east Kuiu Island. These roads provide access to more areas not as readily available for harvesting subsistence resources. The road construction associated with the proposed timber harvest alternatives would increase access into areas traditionally used as subsistence harvest areas (see the study area Alternative Maps). Other rural communities besides Rowan Bay could benefit from the increased access if cars and pickups could be transported efficiently to Kuiu Island. Presently, the only way to do this is by boat or barge. The Alaska Marine Highway System does not serve Rowan Bay and there is no indication it will do so in the foreseeable future.

Alternative 3 states that the proposed log transfer facility (LTF) at No Name Bay, Fantasy Island site, (VCU 417) could impact the anchorage normally used by subsistence users from Point Baker and Port Protection. In response to the possible loss of this anchorage site, either a public float or mooring sites (boom logs positioned by anchors or pilings) would be constructed on the southwest side of the present anchorage.

During an ANILCA 810 hearing in the community of Point Baker, citizens presented verbal and written testimony opposing development within No Name Bay. One reason given was the potential effects on the anchorage site at No Name Bay-Fantasy Island site. People testifying felt the suggested public float or mooring sites would not offset the loss of this valuable anchorage. After considering these concerns, the Forest Service maintains that either a public float or mooring sites would mitigate the loss of the anchorage site.

Alternative 4 proposes an LTF along the southeastern limits of No Name Bay. This potential development site would not impact traditional access to the area by subsistence users.

Competition for Wildlife

A substantial increase in competition for subsistence wildlife resources from non-rural community residents is not projected to result from the alternatives proposed in the FEIS. Nor is competition for those wildlife resources projected to increase in the foreseeable future due to activities proposed in this project. This is because the opportunity for easy and economical access to Kuiu Island by non-rural residents and out-of-state hunters is assumed to remain limited during the life of the proposed project.

Black bear is the only known wildlife resource currently being harvested on Kuiu Island by non-rural and out-of-state residents. Since 1985, nonresident hunters, guided by outfitters, have taken 58 percent of the black bear harvest on Kuiu Island. There are no documented connections between the increase in nonresident black bear harvest and land management ac-

tivities. Some black bears are thought to be harvested by Alaska nonresident hunters employed at Rowan Bay. There has been no direct comments in any of the applicable ANILCA 810 Hearing testimony to indicate that competition for black bear by the nonresident hunters and non-rural Alaskan residents is affecting the ability of rural community residents to harvest black bear.



Hearing testimony from Kake indicates that Rowan Bay residents are harvesting waterfowl. They may also be harvesting furbearers. It is likely some waterfowl and furbearers are being harvested by residents of Rowan Bay who are not yet qualified as Alaska residents or who are rural community residents seasonally employed at Rowan Bay.

People who testified at earlier Point Baker and Kake Hearings expressed concern that increased competition from loggers for subsistence wildlife resources would affect their ability to harvest those resources. This previous testimony by residents of Point Baker and Kake focused on alternatives which proposed to construct a log transfer facility, logging camp, and a log-chipping facility at No Name Bay. Kake testimony focused on the cultural and subsistence use of the northern portion of Kuiu Island. Their primary concern was the protection of Security Bay's "Fall Dog Creek". Currently there is no alternative which proposes any action along the west side of Security Bay.

Some residents of the logging camp at Rowan Bay have met residency requirements and do qualify as subsistence users. Residents of the logging camp proposed for No Name Bay in Alternatives 3 and 4 would qualify as subsistence users if they meet residency requirements. The new camp may be considered a rural community if it were occupied year round, however, it is anticipated that the camp will be occupied seasonally.

The Forest Service is sensitive to the concerns expressed in past and recent ANILCA 810 testimony and has endeavored to accommodate the needs of the rural communities utilizing the study area. There could be an increase in short term competition from individuals associated with the Rowan Bay facility or similarly employed at the proposed logging camp and LTF at No Name Bay. However, this possible increase in competition is not projected to be substantial or long term because of the limited number of people potentially involved and the seasonal availability of resources for harvest.

Wildlife Findings

Based on the habitat capability models used, the FEIS concludes the actions proposed in Alternatives 2 through 4 may significantly restrict subsistence use of deer. A finding of no significant possibility of a significant restriction is in order for the remaining wildlife resources. The Finding is based on projected resource effects by the three evaluation categories shown in the following table.



Table 3-45

Significant Possibility of a Significant Restriction of Wildlife Resources¹

	Alternative			
	1	2	3	4
Abundance or Distribution	No	No	No	No
Access	No	No	No	No
Competition	No	No	No	No

Source: Roberts, 1992

¹ "Yes" Indicates there may be a significant restriction and "No" indicates there is no significant possibility of a significant restriction.

Fish and Shellfish Effects and Evaluation

Fish and shellfish are important subsistence resources used by the rural residents utilizing the analysis area. The 1987 Tongass Resource Use Cooperative Survey (TRUCS) indicated fish and shellfish made up 32 to 80 percent of the per-capita harvest of principle resources harvested by subsistence users of the analysis area. Per capita harvest of salmon, other fin-fish, and shell fish ranged from 278 to 686 pounds for these communities. These totals do not necessarily reflect specific harvest from the study area.

Abundance and Distribution of Salmon

Salmon are a major source of subsistence food harvested by the rural residents. Per capita harvest of salmon ranged between 85 and 241 pounds for the communities using the study area. These harvest figures of this resource do not necessarily reflect specific numbers from the study area.

People who testified at the Kake ANILCA 810 hearings emphasized the importance of protecting salmon habitat, and specifically the streams flowing into Security Bay, especially a particular stream with a late-fall chum salmon run (Fall Dog Creek). These residents have traditionally depended on this stream for their fall chum. In past testimony they have expressed concern about any proposed roading at the head of Security Bay near Salt Chuck Lake, along with any proposed road construction and timber harvest in the Security Bay area which might impact this traditionally and culturally important fall chum salmon run. Through use of buffers as directed by the Tongass Timber Reform Act (1990), and the Aquatic Habitat Management Handbook, this concern has been significantly reduced or eliminated. Additionally, a seasonal gate closure was mandated in the Record of Decision for the Final SEIS for road #6425. The gate was installed in 1991 to restrict Rowan Bay residents from utilizing portions of the Security Bay area.

This FEIS states each of the action alternatives has some associated risk for impacting fish habitat within the study area. However, the use of stream buffers and the application of Best Management Practices are expected to be effective to protect fish habitat from the potential effects of the proposed action. All proposed timber harvest units near salmon spawning and rearing streams are protected by buffers of at least 100 feet on each side of Class I streams and 100 feet on each side of Class II streams that are flow directly into Class I streams. The effects from the proposed actions for the foreseeable future are also projected to be minor. Thus, the effect on the abundance and distribution of the salmon harvest for subsistence uses on Kuiu Island would be negligible.



Abundance and Distribution of Other Finfish

The action alternatives for the study area are projected to have no impact and no foreseeable future impact on other finfish habitat. Therefore, the abundance and distribution of those other finfish would not be affected by the proposed activity.

Abundance and Distribution of Shellfish

The FEIS projects no measurable effects due to Alternatives proposing timber harvest, road construction, and construction of a log transfer facility on habitat for crabs, clams, and other shellfish. The construction of a log transfer facility at No Name Bay, proposed in Alternatives 3 and 4, would affect slightly over 3 acres of marine habitat. The effect on the abundance and distribution of local crabs, clams, and other shellfish is projected to be negligible. The project effects for the foreseeable future are also projected to be negligible.

Access to Fish and Shellfish

Access to historic subsistence use areas is not projected to be affected by past land use activities and would not be affected by any of the proposed activities or development. Nor is there a significant possibility it would be affected in the foreseeable future because of the proposed activities related to this development. This determination is made because traditional access to the area for subsistence use by foot and boat access would remain unchanged, although there would be increased access via roading to reaches of streams that were not previously used for the harvest of salmon.

Competition for Fish and Shellfish

The FEIS concludes the construction of a log transfer facility and logging camp at No Name Bay could affect subsistence uses by Point Baker and Port Protection residents. The effects were projected to come from potential increased competition of logging camp residents for crabs, clams, and other shellfish. Testimony from a Hearing at Point Baker and Port Protection reaffirmed concerns related to potential competition for subsistence resources. Competition is expected to be minimal because the proposed logging camp would contain only a bunkhouse used for intermittent timber harvest and road construction activities in the area. Rowan Bay would continue to be the primary base camp through the life of the project. Unlimited access by small boats for harvesting crabs, clams, and other shellfish in the No Name Bay area by logging company employees from Rowan Bay is also expected to be small.

Kake residents testified that people from Rowan Bay have fished cohos from reaches along existing roads in the Security Bay drainage (VCU 400). They expressed concern about the depletion of these coho stocks due to harvesting by Rowan Bay residents.



The FEIS assumes some residents of Rowan Bay have met residency requirements and qualify as subsistence users. As indicated in the discussion concerning competition for wildlife, there may be some increased competition for subsistence fisheries resources from Alaska nonresidents and non-rural residents employed at Rowan Bay or from the proposed logging camp at No Name Bay. However, this increase is not expected to be substantial, due to the small number of people involved, and the intermittent use of the available subsistence resources.

Fish and Shellfish Findings

Based on the data and models used, the FEIS concludes the actions proposed in Alternatives 1 through 4 would not cause a significant possibility of a significant restriction of subsistence use of fish and shellfish in the analysis area. The Finding is based on projected resource effects by the three evaluation categories shown in Table 3-46.

Table 3-46

Significant Possibility of a Significant Restriction of Subsistence Use of Fish Resources

	Alternative			
	1	2	3	4
Abundance or Distribution	No	No	No	No
Access	No	No	No	No
Competition	No	No	No	No

Source: Roberts, 1992

1 "Yes" Indicates there may be a significant restriction and "No" indicates there is no significant possibility of a significant restriction.

Other Foods Effects and Evaluation

Information and data from the Tongass Resource Use Cooperative Survey (TRUCS), ADF&G Subsistence Division Technical Reports, public comments, and ANILCA 810 Subsistence Hearing testimony have provided additional information concerning the gathering of other foods by rural communities using the analysis area. Other foods used for subsistence include plants such as kelp, goose tongue, a variety of berries, etc. Though other foods did not constitute a major portion of the 1987 subsistence harvest by the rural commu-

nities documented in TRUCS, they are considered subsistence resources. TRUCS data indicated plants made up 1.4 to 7.5 percent of the per capita harvest of principle subsistence resources harvested by subsistence users of the analysis area. The pounds per capita ranged from 2.3 in Wrangell to 23 in Port Alexander.



Abundance and Distribution of Other Foods

Most traditional gathering of other foods occurs near beach and estuarine areas. With the exception for the log transfer facility proposed in Alternatives 3 and 4, no activities proposed in the alternatives would infringe upon the beach and estuarine areas. The proposed timber harvest activity would improve the availability of berries in the short-term. Based on a projected increase of berries and the locations of the potential activities, short term and reasonably foreseeable effects of the proposed action alternatives on abundance and distribution would be minimal.

Access to Other Foods

Access to traditional other food gathering sites and areas have not been affected by past land use activities and will not be affected by any of the proposals in this analysis. Nor will there be a significant restriction in the foreseeable future as a result of the activities proposed here. This is because traditional means of access via foot and boat would remain the same.

Roads in the No Name Bay area currently do not exist. Once they are constructed they will open up areas not traditionally used for other food gathering. The Forest Service is not aware of any residents from the surrounding rural areas using the current road system to access other food gathering sites and areas.

Competition for Other Foods

People who testified at an earlier Point Baker Hearing expressed concern that increased competition from loggers for other foods would affect their ability to harvest those subsistence resources. Point Baker and Port Protection testimony focused on Alternatives 3 and 4, which proposed to construct a log transfer facility, sort yard, and logging camp at No Name Bay.

Some residents of Rowan Bay may have met residency requirements and qualify as subsistence users. Residents of the logging camp proposed for No Name Bay in Alternatives 3 and 4 would qualify as subsistence users if they met residency requirements. The new camp may be considered a rural community if it were occupied year-round.

As indicated in the discussion concerning competition for wildlife, there may be some increased competition for other food resources from Alaska nonresidents and non-rural residents employed at Rowan Bay or from the proposed logging camp and LTF at No Name Bay. However, this increase would not be substantial or long-lived, due to the limited number of people involved and intermittent use of the proposed camp and facility.



Other Foods Finding

Based on the data and models used, the FEIS concludes the actions proposed in Alternatives 1 through 4 would not result in a significant restriction of subsistence use of other food resources within the analysis area. The Finding is based on the potential resource effects by the three evaluation categories shown in Table 3-47.

Table 3-47

Significant Possibility of a Significant Restriction of Subsistence Use of Other Food Resources

	Alternative			
	1	2	3	4
Abundance or Distribution	No	No	No	No
Access	No	No	No	No
Competition	No	No	No	No

Source: Roberts, 1992

1 "Yes" Indicates there may be a significant restriction and "No" indicates there is no significant possibility of a significant restriction.

Marine Mammals Effects and Evaluation

The Marine Mammal Protection Act (1972) prohibits the taking of marine mammals by anyone other than Alaska Native hunters. The Act allows Alaska Natives to take marine mammals, so long as it "is not accomplished in a wasteful manner", for any "subsistence purpose" or to create "authentic Native" handicrafts or clothing.

Currently there is no evidence to suggest that timber harvest activities have any effects on marine mammals. Therefore, there is no significant possibility of a significant restriction to subsistence use of marine mammals by the rural communities surrounding the analysis area.

Timber Effects and Evaluation

The Forest Service free-use policies in Alaska for firewood and timber remain unchanged. None of the proposed alternatives for the analysis area affects the availability of firewood and personal use timber.

Direct, Indirect, and Cumulative Effects

This FEIS evaluates whether the project in combination with other past, present, and reasonably foreseeable future actions, may significantly restrict subsistence uses. The precise location of future projects is not clearly known until such time as a project is proposed. The

subsistence evaluation concludes whether future activities may significantly restrict subsistence uses.

Life of Sale projections based on the current Forest Plan data adjusted for TTRA legislation show that approximately 42,000 acres may be harvested from the analysis area by the year 2011. It is assumed that approximately 98,000 acres will be available from these same VCUs for timber harvest by 2080. However, actual scheduling of harvest beyond 2011 is largely speculative, making projections about effects on subsistence resources beyond that date subjective.



Actions on other lands surrounding the analysis area may also affect subsistence resources harvested by the rural communities utilizing the area. An example is the State of Alaska's selection of lands within No Name Bay for potential future town site development. There is the potential for such development to have long term implications for subsistence users and rural communities utilizing the area.

The wildlife section of this chapter indicates that the habitat capability of black bear, marten, river otter, and Vancouver Canada Geese will be minimally effected through the year 2011. The deer habitat capability model indicates that there could be a reduction in deer habitat by the year 2011. This change in habitat capability could affect abundance and distribution.

The cumulative effects on fish habitat are primarily associated with past logging. It is anticipated that application of BMPs and streamside buffers will minimize impacts to fish habitat. The watershed section of this chapter discusses the threshold levels of concern for the watersheds in the project area which indirectly effect fish habitat.

The following table lists the other timber sale projects proposed in the vicinity of the North and East Kuiu Project. Enough is known about foreseeable activities on other lands surrounding the project area to project that subsistence use of deer may be significantly restricted. Subsistence use of black bear, furbearers, waterfowl, salmon, other finfish, and other food subsistence resources in the project area is not expected to be significantly restricted by these future activities.



Table 3-48

**Proposed Future Timber Sale Projects on the Stikine Area
within or near the Study Area**

Project	Location	Projected Volume (MMBF)	Projected Date
Kuiu 96+	Kuiu Island	140	1996
Douglas	Kupreanof Island	46	1994
Clover	Kupreanof Island	18	1994

Source: Stikine 10-Year Action Plan

The Forest Service is in the process of revising the Tongass Land Management Plan (TLMP) through the NEPA process. Potential effects to subsistence users are being addressed during the revision. Project environmental analyses will be required prior to harvest of any additional timber beyond the amount proposed in this project. Subsistence use effects will be evaluated in each of those analyses.

TLMP analysis has determined that all of the alternatives considered in the revision of the Forest Plan, if all permissible projects were fully implemented, have the potential to impact subsistence uses of deer, brown bear, and furbearers, specifically marten, due to potential effects of projects on abundance/distribution and competition (TLMP Revision, Supplement to the DEIS). Due to the uncertainties associated with projecting impacts of proposed forest-wide projects fifty years into the future, it is difficult to say whether these impacts would rise to the level that they may significantly restrict subsistence uses of these resources.

Should subsistence resources become limited at some point, the Federal Subsistence Board has the authority to regulate subsistence and non-subsistence uses of these resources. This type of action, as prescribed by ANILCA Section 804, may be necessary to ensure the availability of adequate subsistence resources needed by the rural communities using Kuiu Island.

Displacement of Subsistence Users

Kake Tribal and Sealaska Corporations continue to harvest timber on Kupreanof Island surrounding the community of Kake. This harvest has had a major influence on locally available subsistence resources for the community. Based on public comments, and testimony during ANILCA 810 Hearings, there is concern about cumulative effects of timber harvest on Kupreanof and Kuiu Islands, and long term implications for resources that this community depends upon for subsistence. As a result of deer harvest closures in the 1970s, Kake subsistence users were displaced to southern Admiralty Island. It appears that deer populations are now on the increase and subsistence harvest could be allowed in the foreseeable future on Kuiu and Kupreanof Islands.

The proposed No Name Bay LTF and associated camp will result in limited displacement of subsistence users. Harvest of other foods (such as seaweed) occurs near No Name Bay and users of that area may be displaced as a result of this development.

The proposed timber harvest activities are not expected to displace subsistence users from their traditional areas used for harvesting wildlife (other than deer), marine mammals and timber. However, some subsistence users have indicated they would avoid areas when there was noise or other evidence of logging activity in the vicinity. This could result in some temporary displacement of subsistence activities. Since the beach, estuary, and stream buffers where most of the subsistence activities occur will remain intact, subsistence activities will likely resume once the adjacent logging is finished.



Subsistence Determinations

Section 810 (a)(3) of ANILCA requires that when a use, occupancy, or disposition of public lands would significantly restrict subsistence uses, determinations also must be made that (1) the significant restriction of subsistence uses is necessary, consistent with sound management of public lands, (2) the proposed activity involves the minimum amount of public lands necessary, and (3) reasonable steps will be taken to minimize adverse impacts on subsistence uses and subsistence resources resulting from the action. The proposed action may significantly restrict subsistence uses of deer.

Necessary, Consistent with Sound Management of Public Land

The actions proposed in this document have been examined to determine whether they are necessary, consistent with the sound management of public lands. Standards used for the review include (1) the National Forest Management Act of 1976 and its implementing regulations; (2) the Alaska National Interest Lands Conservation Act (1980); (3) the Alaska Regional Guide (1983); (4) the Tongass Land Management Plan and draft Revision; (5) the Tongass Timber Reform Act (1990); (6) the Alaska State Forest Practices Act; and (7) the Alaska Coastal Management Program.

The ANILCA placed an emphasis on the maintenance of subsistence resources and lifestyles. However, the Act also required the Forest Service to make available for harvest 4.5 billion board feet of timber per decade from the Tongass National Forest and left the APC contract in place. The TTRA removed the 4.5 billion board foot requirement from ANILCA, but directed the Forest Service to seek to meet market demand and the market demand for the planning cycle and left the volume requirements and contract area of the APC contract in place. Demand for timber from the Tongass National Forest is expected to remain near 400 million board feet per year from 1990 to 2011.

The alternatives presented here encompass three action alternatives that would produce the resources that would best meet the needs of the American people, help achieve multiple use management objectives in the TLMP and meet APC contract obligations. All of the action alternatives involve some potential to impact subsistence uses. There is no alternative that will meet APC contract requirements and NEPA objectives and yet avoid a significant possibility of significant restrictions somewhere in the Forest (Appendix A of the TLMP Revision, Supplement to the DEIS, 1990). Therefore, based on the analysis of the information

presented in this document on the proposed alternatives, these actions are necessary and consistent with sound management of public lands.

Amount of Land Necessary to Accomplish the Purpose of the Proposed Action



Appendix F addresses the availability of other lands within the APC contract area suitable for the timber harvest. Much of the Tongass National Forest is used by one or more rural communities for subsistence purposes for deer hunting. The areas of most subsistence use are the areas adjacent to existing road systems, the beaches, and the areas in close proximity to communities. Within the project area, the extent and location of the subsistence use area precludes complete avoidance. Areas other than subsistence use areas that could be harvested may be limited by other resource concerns such as soil and water protection, high-value wildlife habitat, economics, visuals, or unit and road design. Effort was taken to protect the highest value subsistence areas. For example, beach fringe is one of the highest use subsistence areas and, at most, eight acres will be harvested under any of the proposed alternatives. At most, eight acres of beach fringe have been harvested in the past in VCU 417.

The impact of viable timber harvest projects always includes alteration of old-growth habitat which reduces projected habitat capability for old-growth dependent subsistence species. It is not possible to lessen harvest in one area and concentrate it in another without impacting one or more rural communities' important subsistence use areas. In addition, harvestable populations of game species could not be maintained in a natural distribution across the Forest if harvest were concentrated in specific areas. A well-distributed population of species is also required by the Forest Service regulations implementing the National Forest Management Act (NFMA).

Reasonable Steps to Minimize Adverse Impacts Upon Subsistence Uses and Resources

Chapter two describes the standards, guidelines and mitigation measures that will be implemented as part of the selected alternative. Most of the standards, guidelines and mitigation measures are designed to maintain fish and wildlife habitat productivity at as high a level as possible, consistent with meeting existing timber harvest contract commitments. In addition, Appendix C contains the monitoring worksheets that will verify the effectiveness, validity, and implementation of various mitigation measures that directly or indirectly effect subsistence use.

All of the action alternatives have incorporated the Forest Plan Revision standards and guidelines. Project design criteria included locating roads and units outside of important subsistence use areas such as the beach fringe, estuary fringe, and riparian areas adjacent to salmon streams. This has resulted in protection of the highest value subsistence use areas. For example, beach fringe is one of the highest subsistence use areas and, at most, eight acres will be harvested under any of the action alternatives. These eight acres are a result of the proposed LTF at No Name Bay in Alternatives 3 and 4.

Perhaps the most significant subsistence resource in the analysis area is the salmon. Fish habitat is protected in each alternative through the application of the BMPs and stream buff-

ers. In addition to protecting fish habitat these buffers also protect estuarine and riparian habitat important to other species such as deer, black bear, and furbearers.

Deer harvesting is not currently permitted within the analysis area, but could be in the future. Mitigation to enhance deer habitat in second growth stands following timber harvest includes thinning to a wider than normal spacing and pruning. Both of these are designed to improve forage. Thinning to a wider standard has been successfully employed in southeast Alaska. Pruning, which has been effective elsewhere, has not been fully assessed in southeast Alaska.



Final EIS Conclusions

The FEIS for the north and east Kuiu Island project includes a final determination about the significant restriction on subsistence use that may result from the implementation of the preferred alternative. Below is a summary of the FEIS evaluation and findings:

- The potential foreseeable effects from the action alternatives in this project do not present a significant restriction of subsistence uses of black bear, furbearers, marine mammals, waterfowl, salmon, other finfish, and other foods.
- There may be a significant restriction on subsistence use of deer in the project area for Kake, Klawock, Petersburg, Port Alexander, Port Protection, Point Baker, Sitka, and Wrangell residents regardless of which alternative is implemented.

ANILCA 810 Hearing Summary and Meeting with Southeast Native Subsistence Commission

ANILCA 810 subsistence hearings were held in relation to the APC Long Term Sale draft EIS for the North and East Kuiu Island study area. Hearings were held in the following communities: May 12, 1992-Point Baker; May 13, 1992- Port Alexander; May 14, 1992-Kake; May 15, 1992-Petersburg; June 18, 1992- Petersburg; June 24, 1992-Kake. Legal notice was provided via the Petersburg Pilot and Wrangell Sentinel, as well as notification on KSTK-FM Wrangell, KFSK-FM Petersburg, KRSA-AM Petersburg, KCAW-FM Sitka, and local cablevision mini-scan. Notification was posted in prominent locations, an example would be all the local Post Offices announcing the date, time, place, and purpose for the hearing(s). Letters announcing the hearings were sent to ADF&G-Subsistence Division, Chairpersons of State of Alaska Regional & Local Fish and Game Advisory Committees, Federal Subsistence Board, Southeast Native Subsistence Commission, City of Kake, and other interested publics. Hearing testimonies have been included in Appendix K of this FEIS.

An informal meeting was held with the President of the Southeast Native Subsistence Commission (SENSC) on August 4, 1992. The purpose for the meeting was to explore possible options and opportunities for minimizing impacts to the subsistence resources depicted in the North and East Kuiu Island EIS.

Timber



Affected Environment

Plant Communities

The vegetation on Kuiu Island is a mosaic of coniferous forest stands interspersed with marine estuaries, muskegs, shrublands, and alpine sites. All the proposed harvest units are within forest communities which are described by plant associations (R10-TP-72). Plant associations are an ecological based classification which describes sites by vegetative responses to the environment. Certain environmental characteristics result in predictable plant communities. As a plant community develops there are predictable successional changes which occur. Eventually a plant community reaches a state of little change or a climax condition common to plant communities which have not experienced recent disturbance.

Plant associations are a description of climax forest communities which are categorized by the dominant climax tree species and called plant association series. The five series which describe the harvest units on Kuiu Island are briefly described below. Intensive inventories about plant association locations have not been completed so relative abundance is estimated from available field information.

Western Hemlock Series - The plant associations in this series are the most abundant. It is estimated that 90% of the harvest unit acreage will be classified within these plant associations. The sites are relatively productive, and are generally located in the upland slopes which have moderate to well-drained soils.

Mixed Conifer Series - These sites generally occur in uplands, and are often associated with muskegs. Site productivity is often limited by poor soil drainage.

Mountain Hemlock Series - These associations are generally found on cooler, higher elevation sites above western hemlock series. Site productivity is limited by shorter, cooler growing seasons and reduced soil drainage on some sites.

Sitka Spruce Series - Associations within this series are usually near riparian areas or older disturbed sites including avalanche chutes or landslides. These sites usually have good drainage and are relatively productive.

Western Hemlock/Yellow-cedar Series - These sites generally occur on mountain slopes with shallow soils or poor drainage which limit site productivity.

Large western hemlock trees dominate most forest stands which include the proposed harvest units. Sitka spruce is found in most stands, but the amount depends upon sites and stand history. Normally the stands with a high percentage of Sitka spruce are in areas which were originally disturbed by blowdown or soil movement. Yellow-cedar is found in some areas, especially near muskegs or in certain drainages with site characteristics favorable for natural yellow-cedar regeneration. Mountain hemlock is normally found on higher elevation sites. Western red cedar, shore pine, and alder are generally not found within the harvest units in sufficient numbers or size to have commercial value.



Western hemlock and Sitka spruce dominate forest stands throughout southeast Alaska and the study area. Both species are capable of growing in shaded areas (shade tolerant) and they are prolific seed producers. Other tree species include western redcedar, yellow-cedar, mountain hemlock, cottonwood, red alder, and shore pine.

Western hemlock and Sitka spruce develop best on well-drained valley bottoms and lower slopes. However, they also occur anywhere between sea level and the timberline. Both are harvested for commercial purposes.

Western redcedar is found on Kuiu Island, but does not extend northward. Both western redcedar and yellow-cedar represent less than 10 percent of the forested stands in the study area. Western redcedar probably represents less than one percent of the commercial volume in the study area. Yellow-cedar is interspersed in stands throughout much of the study area and is a highly valued commercial species.

Noncommercial tree species include red alder, which is often found along beaches, streams and on steeper slopes where soils have been disturbed. Shore pine (*Pinus contorta* var. *contorta*) (also known as lodgepole pine, coast pine, and beach pine) is commonly found in muskegs.

Most of the commercial forest land on the Tongass National Forest has not been disturbed for centuries, and is considered to be in the climax stage of plant succession. Most climax forest communities have old-growth forest characteristics. In this document, "old-growth forest" refers to the characteristics of some mature and overmature stands.

Mature and overmature stands have variable tree heights because they contain trees of many ages, sizes and condition, including dead tops and snags. In contrast, stands that have been disturbed during the last 100 to 200 years by landslide or windthrow have a more uniform appearance because they contain trees of relatively uniform age and size, with fewer snags and defective trees. As even-aged stands mature, trees die due to the influences of insects, disease, wind, and ice. This opens the site to new seedlings and, in time, creates an uneven-aged stand structure.

The shrub species within many stands on Kuiu Island include huckleberry, rusty menziesia, and devil's club. The forest floor is often covered with a mat of assorted plants including mosses, liverworts, ferns, bunchberry dogwood, and skunk cabbage. Streamside riparian



vegetation usually includes salmonberry, devil's club, alder, grasses, sedges, ferns and currants.

Muskegs are interspersed among forest stands where water drainage is restricted. The vegetation in the muskegs includes stunted hemlock, shore pine, and yellow-cedar with ground plants including sphagnum mosses, sedges, and small shrubs.

Tide flats are located in many of the bays and estuaries. The beach meadows between the tide flats and the forest include a variety of grasses, sedges, and ferns. Subalpine and alpine communities above 2,000 feet are characterized by short shrubs, trees, grasses, and sedges.

Southeast Alaska vegetation, plant communities, and forest succession typical of Kuiu Island are further described in "The Forest Ecosystem of Southeast Alaska" (Harris and Farr 1974), "Preliminary Forest Plant Associations of the Stikine Area, Tongass National Forest" (R10-TP-72), the "Southeast Alaska Area Guide", and the Supplement to the Draft EIS for the Tongass Land Management Plan Revision.

Natural Forest Succession

When plant communities change in the absence of disturbance, their development is referred to as succession. Succession is a dynamic and predictable process which responds to the composite of all physical and biological factors. Succession can occur on very small microsites or expansive areas, resulting in a complex pattern of stand sizes with varied plant species and age classes.

Plant communities can be read like a table of contents or index of environmental conditions. Some species have a very narrow range of environmental requirements. If these species -- called indicators -- are present, the environmental conditions are probably also present. Other species have little or no indicator value because they can flourish under a wide range of conditions.

Stand development following disturbance, such as windthrow, depends upon the severity of disturbance and the attributes of the plant association. Usually forb, shrub, and conifer establishment begins soon after disturbance. This vigorous, aggressive, community development is due to increased solar radiation which raises soil temperatures and increases soil biological activity. This results in an increase of nutrient availability and responding plant community growth and development.

As a young forest plant community develops with increased sunlight, the conifer seedlings develop into an even-aged stand. There are commonly over 3,000 tree seedlings per acre in young stands, and the understory vegetation provides aggressive competition. After 20 to 30 years conifer crowns begin to suppress the growth of the grasses, forbs, and shrubs as sunlight reaching the forest floor is reduced. During the next 30 years of stand development, the trees continue to grow rapidly, but the understory growth slows as light is reduced. By age 60, the trees begin to suffer from competition for sunlight. The rate of tree diameter growth begins to decline and some of the smaller, suppressed trees begin to die.

By age 100 to 150, some trees have developed dominance over others, and the understory again begins to establish itself in openings created by dead trees. As a stand reaches 200 years, it often begins to assume an uneven-age structure with variable tree ages and a mosaic of understory species. These mature stands normally have reached an equilibrium in biomass growth, and the establishment and growth of new trees depends upon the death of larger trees within the stand.



Factors Affecting Natural Forest Succession

A wide variety of plant species are found on the varied sites of Kuiu Island. The diversity of plant species is the result of varied soils, precipitation, temperature, solar energy, wind, and the stage of successional change. The western hemlock-Sitka spruce forests of southeast Alaska are influenced most significantly by the maritime climate which provides abundant precipitation and relatively cool summer growing temperatures. Plant growth on Kuiu Island is supported by moist growing conditions which make these forests some of the most productive in the world. The influence of the Gulf of Alaska tends to moderate extreme high and low temperature variation, but the northern latitude results in lower temperatures. These cool summer growing conditions provide the primary factor which limits plant growth. The soil temperatures are lowered because of the low air temperatures, the low angle of sunlight, the dense conifer stands, and frequent cloud cover. These low soil temperatures in turn restrict plant growth by reducing photosynthetic rates, microbial activity, and nutrient availability for the plants.

Damaging Agents

Mortality becomes noticeable as trees grow older and become less vigorous. Besides age, the primary factors which contribute to or cause tree death include wind, disease organisms, and insects.

Forest succession is influenced by wind more than any other physical factor on most sites planned for harvest. Intense storms which often occur during the fall and winter months bring strong winds and heavy rainfall. These storms can cause considerable tree damage because of the shallow rooted trees which are usually found on wet, shallow, organic soils. High-velocity winds during fall and winter storms uproot (blowdown) and break trees, especially taller trees on exposed sites.

Disease organisms are both primary and secondary causes of stand mortality in older stands. Decay caused by heart and root-rotting fungi and stem diseases are the greatest cause of wood loss in overmature stands. Western hemlock dwarf mistletoe is a parasite which causes a loss of vigor in some mature forest stands.

Insect populations are often limited by our cool, moist climate, but widespread defoliation can be caused by the black-headed budworm and the hemlock saw-fly. Significant mortality of yellow-cedar has been occurring for many years, but the cause is yet to be determined.

Commercial Forest Land

Depending on its vegetative cover, land in the Tongass National Forest is categorized as commercial forest land (CFL), noncommercial forest land, or nonforest (Table 3-49). About 71 percent of the land in the study area consists of CFL, which is land producing or capable



of producing continuous crops of timber and that has not been withdrawn from the timber base by statute or administrative action. TLMP specified that in order to be capable of commercial timber production, the land must be able to produce 20 cubic feet/acre/year, or be inventoried as having 8 thousand board feet (MBF)/acre (Forest Service, TLMP Landtype/Timber Task Force Working Report). Mature, overmature, and second-growth stands, as well as areas that have been logged and/or regenerated, are considered CFL. Commercial forest land also includes both accessible and inaccessible areas.

Table 3-49

Acres of Forest Type

Category	Acres
Non-Forest	8,220
Forested Non-CFL	53,150
Inoperable CFL	
Physically Inoperable CFL(Oversteep)	30,750
Class I Legislated (TTRA) Inoperable CFL	4,160
Class II Legislated Inoperable CFL	1,420
Class I Legislated Inoperable CFL (Harvested pre TTRA)	640
Class II Legislated Inoperable CFL (Harvested Pre TTRA)	320
Operable CFL	
Managed Stands (Harvested as of TTRA Passage)	21,014
Normal Operable CFL	78,920
Non-Standard (Access limited) CFL	13,750
Non-Standard (Isolated) CFL	2,060
Total Acres	214,395
Source: Gerdes, 1991	

Forested non-CFL makes up about 25 percent of the study area. Non-CFL is forested land that is not capable of producing commercial quantities of timber products. The remaining 4 percent of the study area is classified as nonforest and includes salt marshes and estuaries, alpine areas, and non-vegetated mountain tops.

Commercial forest land in the Tongass National Forest has been classified into volume class strata. Each volume class strata represents a range of net sawlog timber volume that could be expected for each acre. Placing the timber in volume class stratas allows the Forest Service to roughly estimate the volume for each VCU. Timber in volume class strata 4 has between 8 and 20 MBF/acre; volume class strata 5, 20 to 30 MBF/acre; volume class strata 6, 30 to 50 MBF/acre; and volume class strata 7, greater than 50 MBF/acre.

Proportion of Volume Classes 6 and 7

The Tongass Timber Reform Act of 1990 modified the long-term contracts to:

"Eliminate the practice of harvesting a disproportionate amount of old-growth timber by limiting the volume harvested over the rotation in Volume Classes 6 and 7, as defined in TLMP and supporting documents, so that the proportion of volume harvested in these classes within a contiguous management area does not exceed the proportion of volume currently represented by these classes within the management area."



Table 3-50 shows the baseline proportionality that existed in the two management areas that propose timber harvest. Management Area S04 includes VCUs 398, 399, 400, 401, 402, and 421. Management Area S09 includes VCUs 416, 417, 418, 419, and 420.

The baseline proportionality is that proportionality which existed in the management area at the time the TTRA was signed into law (November 28, 1990). All of the alternatives will be measured against these values to determine compliance with the proportionality requirements of TTRA. The total timber base of a management area includes all old-growth timber (volume class strata 4 through 7) that existed in the management area as of November 28, 1990, minus those acres in wilderness, TTRA LUD IIs, and TTRA mandated 100-foot buffers on each side of Class I streams and those applicable Class II streams.

Table 3-50			
Proportional Volume Class Strata Summary			
Management Area	Total Timber Base	Volume Class Strata 6 and 7	
		Total Acres	Percent
S04	92,616	23,628	25.5%
S09	48,493	3,596	7.4%
Source: Gerdes, 1991			

Operable and Inoperable CFL

Commercial forest land is further classified as inoperable CFL, normal operable CFL, or nonstandard operable CFL (see Table 3-49 for the distribution in the study area). Inoperable stands are those in which potential resource damage or physical limitations make harvest of trees uneconomical or impractical. A primary difference between normal operable and nonstandard operable CFL is that normal stands have less potential for erosion and slope failure than nonstandard stands. Nonstandard logging systems may also be employed if other resource protection mitigation requirements cannot be met with conventional systems.

Normal operable stands may be logged using conventional systems, including 1,250-foot highlead; 1,000-foot short-span skyline; 1,000-to 2,000-foot intermediate-span skyline;



2,000- to 2,600-foot long-span skyline; cold deck and swing; track loader; or A-frame. Nonstandard yarding techniques, which result in less impact on soils than the common methods listed above, may be employed to log nonstandard operable stands. Nonstandard techniques include: multispan skyline; long-span skyline over 2,600 feet; and helicopter yarding systems.

Of the approximately 119,000 acres of operable CFL, both normal and nonstandard, the current Tongass Land Management Plan requires approximately 10 percent be retained for either wildlife habitat needs, or to meet visual quality objectives.

Stand Management

Existing Condition

The stands considered for harvest on Kuiu Island are overmature with western hemlock, Sitka spruce, and yellow-cedar trees. The primary conifer species to be managed are western hemlock and Sitka spruce. Huckleberry and bunchberry are usually found with these trees and have high value as wildlife forage. Sitka spruce and western hemlock are prolific seed producers, regenerating themselves rapidly where the forest floor is opened up to sunlight and growing space. Sunlight in productive forest stands is the principle limiting factor of tree growth. When sunlight and growing space is available, the cool and moist climate makes southeast Alaska forest land some of the most productive in the world.

Management of the hemlock-spruce forests of southeast Alaska is described in "Silviculture Systems for the Major Forest Types of the United States" (Agriculture Handbook #445), and "The Forest Ecosystem of Southeast Alaska (Harris and Farr, 1974).

The over-mature stands proposed for harvest have an estimated net volume of approximately 21 MBF/acre. If untreated, the net volume of these stands will remain relatively constant the next 100 years because additional stand growth will be reduced by a similar amount of stand mortality and stem rot. If these same stands are harvested there will be a significant increase in the net volume per acre after 100 years. This increased net volume will result from a low level of tree mortality, low percentage of stem rot, full site occupancy by trees, and a greater percentage of tree growth in merchantable stems. The net volume growth in the new managed stands after 100 years is estimated to be over 45 MBF/acre (Forest Service, 1992). A managed stand would therefore accumulate an estimated 66 MBF/acre (21 MBF current harvest + 45 MBF future harvest) after 100 years.

Timber Harvested

Most of the timber harvested and planned for harvest in the Tongass National Forest has been from mature or overmature stands. Occasionally, second-growth stands (younger, even-aged stands that grew after removal of the previous timber stand) originating from wind or landslide disturbance are harvested. Table 3-51 provides a summary of the past timber acreage harvested prior to and during each five-year period of the APC long term timber sale contract.

Table 3-51

Previous Harvest By Management Area (in acres)

Management Area S04 (North Kuiu)							
VCU	Year						
	Pre-1971	71-75	76-80	81-85	86-90	90-92	Total
398	628	0	74	122	370	0	1,194
399	2,157	245	263	251	1,128	395	4,439
400	0	1,184	2,080	85	571	111	4,031
401	0	0	0	0	0	0	0
402	73	1,579	1,425	474	983	62	4,596
421	256	97	1,791	928	1,578	219	4,868
Total	3,114	3,105	5,633	1,860	4,630	787	19,128
Management Area S09 (East Kuiu)							
VCU	Year						
	Pre-1971	71-75	76-80	81-85	86-90	90-92	Total
416	272	0	0	0	0	0	272
417	398	0	0	0	0	0	398
418	103	0	0	0	0	0	103
419	374	0	0	0	533	436	1,343
420	249	0	0	0	261	607	1,117
Total	1,396	0	0	0	794	1,043	3,233

Source: Gerdes, 1991

Environmental Effects

Stand Harvest

There are many direct effects resulting from forest product harvest of stands on Kuiu Island. This section discusses those effects which include acres and volume harvested, the silvicultural systems and timber harvest methods, and some of the benefits and costs associated with timber management activities.

Tables 3-52 through 3-54 display for each action alternative, the acres proposed for harvest, the percent of operable commercial forest land (CFL), total CFL, and land area proposed for harvest. The tables in this section do not display Alternative 1 because no harvesting is planned as part of this alternative.



Acres Harvested

Alternative 3 would harvest the most acres at 5,527 acres. Alternative 4 would harvest 5,203 acres, and Alternative 2 would harvest the least at 4,762 acres. These alternatives would have approximately the same percentage of acres of the operable commercial forest land harvested.

Table 3-52

Acres of CFL to be Harvested by Alternative 2

VCU	Past Harvest	Alt 2 Proposed Harvest	Total Harvest	Percent Harvested		
				Tentatively Suitable	CFL	Land Area
398	1,194	0	1,194	21%	16%	10%
399	4,439	494	4,933	30%	23%	21%
400	4,031	513	4,544	27%	20%	16%
401	0	0	0	0%	0%	0%
402	4,596	830	5,426	30%	21%	17%
416	272	0	272	3%	2%	2%
417	398	0	398	7%	5%	4%
418	103	0	103	3%	2%	1%
419	1,343	513	1,856	26%	19%	9%
420	1,117	1,771	2,888	22%	16%	9%
421	4,868	641	5,509	28%	21%	16%
Total	22,361	4,762	27,123	23%	16%	12%

Source: Gerdes, 1992

Table 3-53

Acres of CFL to be Harvested for Alternative 3

VCU	Past Harvest	Alt 3 Proposed Harvest	Total harvest	Percent Harvested		
				Tentatively Suitable	CFL	Land Area
398	1,194	0	1,194	21%	16%	10%
399	4,439	0	4,439	27%	21%	19%
400	4,031	248	4,279	26%	19%	15%
401	0	0	0	0%	0%	0%
402	4,596	449	5,045	28%	20%	15%
416	272	1,209	1,481	16%	11%	9%
417	398	1,091	1,489	26%	20%	14%
418	103	743	846	21%	15%	9%
419	1,343	513	1,856	26%	19%	9%
420	1,117	1,251	2,368	18%	13%	7%
421	4,868	23	4,891	25%	19%	14%
Total	22,361	5,527	27,889	23%	17%	12%

Source: Gerdes, 1992





Table 3-54

Acres of CFL to be Harvested by Alternative 4

VCU	Past Harvest	Alt 4 Proposed Harvest	Total Harvest	Percent Harvested		
				Tentatively Suitable	CFL	Land Area
398	1,194	0	1,194	21%	16%	10%
399	4,439	494	4,933	30%	23%	21%
400	4,031	513	4,544	27%	20%	16%
401	0	0	0	0%	0%	0%
402	4,596	830	5,426	30%	21%	17%
416	272	396	665	7%	5%	4%
417	398	1,111	1,509	26%	21%	14%
418	103	713	816	20%	15%	8%
419	1,343	270	1,613	22%	16%	8%
420	1,117	238	1,355	10%	8%	4%
421	4,868	641	5,509	28%	21%	16%
Total	22,361	5,203	27,564	23%	17%	12%

Source: Gerdes, 1992

Sawlog and Utility Volume Harvest

Sawlogs are a net Scribner board foot scaling measure of material from a log which is suitable in size and quality to make sawn lumber. Utility or "pulp" material are logs suitable for production of useable pulp chips. These logs do not meet 1/3 sound sawlog specifications using Scribner Board Foot Scaling and the Northwest Log Scaling Bureau log grade rules. A utility log must have failed the sawlog specification and have at least 50% of the gross scale in firm usable pulp chips. Utility logs commonly have sweep, crook, weather checks, heart checks, or less than 50% heart rot.

Forest Service harvest utilization standards require harvesting the utility grade logs. Prior to passage of the Tongass Timber Reform Act (TTRA), utility volume was required to be removed and purchased, but the volume did not count toward the volume commitment of the long term contract. TTRA now requires inclusion of utility volume as counting toward the contract volume. Table 3-55 displays sawlog and utility volume estimates for each alternative. While both sawlog and utility volume count toward the contract volume, the allowable sale quantity (ASQ) in the Forest Plan is displayed in terms of sawlog volume. To be consistent with the Forest Plan and independent timber sale environmental analyses, references to timber volume elsewhere in this document are measured as net sawlog.

The actual volume available in the harvest units in the preferred alternative will be more accurately determined when the sale offerings are appraised. The appraisal volume will be determined by "cruising" or statistically sampling the volume in the selected alternative.

Table 3-55			
Net Sawlog and Utility Volume by Alternative			
Alternative	Volume Estimate (MMBF)		
	Sawlog	Utility	Total
2	102	16	118
3	116	18	134
4	118	18	136
Source: Gerdes, 1992			

Regeneration Method

Stands can be re-established from seed either as even-aged or uneven-aged stands. Even-aged stands are established using clearcutting, shelterwood, or seed-tree regeneration methods. The seed-tree method leaves enough high quality trees of the preferred species to provide seed to regenerate the stand. This method is normally used with trees which are good seed producers, and have seedlings which grow best in open growing conditions. The shelterwood method leaves enough large trees which provide seedling protection from harsh site conditions while providing a plentiful supply of seed for natural regeneration. After the young stand is established on both the seed-tree and shelterwood the overstory trees are normally removed to provide forest products and to permit the seedlings to grow. The clearcutting method removes the old stand, and a young stand is created by seed from surrounding trees or hand planted. This method is normally used on sites that support species which are prolific seed producers or the seedlings grow best under open growing conditions. All the even-aged methods of regeneration require fewer subsequent stand entries for the purposes of removal of seed or shelter trees, or controlling tree numbers so a healthy forest can be maintained.

Uneven-aged stands are established using the regeneration methods of single tree or group selection which provide protection to small seedlings. The group selection method normally removes trees from an area of one to two acres. This method provides some seedling protection from surrounding trees while permitting shade intolerant seedlings to become established. The single tree method is used for shade tolerant species which are protected by surrounding trees. The uneven-aged methods require frequent stand entries to manage adjacent trees and to control tree numbers, especially with shade tolerant species which become too plentiful with this regeneration method.

Clearcutting is the preferred biologic regeneration method for western hemlock-Sitka spruce stands in southeast Alaska (Ruth and Harris, 1979; Harris, 1989; FS Agricultural Handbooks



445 and 654). For a more indepth discussion of the selection of silvicultural systems in southeast Alaska, see Appendix G of the Supplement to the Draft EIS for the Revision of the Tongass Land Management Plan (Appendix Vol. I, pg. G-1 through G-18). The reasons it is almost exclusively used are because:

- with the shade tolerant species, growth is improved when sites are exposed to sunlight,
- the trees are prolific seed producers,
- blowdown risks are reduced,
- species diversity is enhanced with increased amounts of Sitka spruce and abundant understory species,
- sites are less exposed to potential disturbance from more frequent entries necessary with other regeneration methods,
- fewer stand entries reduce operational costs associated with yarding and stand management,
- dwarf mistletoe can be more effectively controlled, and damage and resulting rot to residual trees is reduced.

Clearcutting as a regeneration method has some resource management problems which include the visual impacts which are readily apparent for some 20 years, potential soil disturbance from yarding logs, and changes in animal habitat and use patterns.

Clearcutting is the recommended regeneration method for all proposed harvest units with the exception of units 416-6, 416-7, and 416-8. These three units are part of a research study area, and the regeneration methods will probably include single tree, group selection, and one or more even-aged methods. The study plan is designed to learn more about water quality, soil and site changes, and regeneration results (see Appendix I). Unit 399-19H will be helicopter yarded, and will remove trees from small patches. The resulting small stands will simulate the results of naturally occurring blowdown while minimizing the visual impacts from saltwater and road systems.

Succession of Managed Stands

The effects of converting old forest stands to young, healthy stands involves many complex ecological interactions. These changes are best understood through the study of adjacent stands which have been converted into managed stands. It is known that when forest stands are opened, the sites respond to the increased sunlight with a massive flush of vigorously growing vegetation. The open forest floor permits entry of soil warming sunlight which rejuvenates plant communities. The increased photosynthetic activity then hastens the flush of forbs, graminoids, shrubs, and tree seedlings. During the first 10 to 20 years after overstory removal, forbs, shrubs, and graminoids dominate the vegetation. When the conifer saplings begin to develop dominance over the understory vegetation, the trees are thinned to less than 300 trees per acre. The understory continues to maintain a predominant part of the plant community for another 20 to 40 years. Few stands in southeast Alaska have been managed beyond this age, but it is known from field trials that understory species can be main-

tained by manipulating the density of the overtopping conifer stand. The future management objectives and associated vegetative treatments can determine forest composition and structure as these young stands grow in future years.

Yarding Methods

Yarding is the process of moving logs from the growing site to a landing. Yarding is accomplished with ground-based equipment including hydraulic shovel/loaders; cable logging systems including highlead and skyline systems; and helicopters. The particular method planned to be used depends upon many factors including road access, soil and slope conditions, operational costs, and production results.



The wet, organic soils of Kuiu Island make track or rubber tire yarding equipment impractical. Because of soil and topographic conditions, cable logging systems are planned in the majority of stands proposed for harvest. These systems include highlead, slackline, gravity skyline, and running skylines with and without grapples. Highlead, slackline and running skyline systems are planned for uphill or downhill yarding. Gravity skyline or flyer systems are only planned for uphill yarding. Highlead systems provide the least log lift, and subsequently are not as useful when soil and water protection needs are necessary. When yarding is down uphill, the drag corridors radiate down and away from the landing. Water moving down the slope is dispersed into the cut unit. When yarding is done downhill, water tends to congregate as drag corridors converge at the landings.

Track-mounted shovel loaders can be used on some slopes which are less than 20 percent. Shovel logging causes only minor soil disturbance because the machine moves on logging slash or moveable support pads. The shovel operation uses the swing boom motion of the loader to swing logs into windrows which are progressively moved to a road. Some harvest units may be yarded with a combination of different systems. Shovel loaders can be used to deck logs some distance from roadside landings. The decked logs can then be efficiently yarded by skyline grapple cable machines.

Skyline systems can provide lift to one end of a log or completely suspend a log above the ground. Site disturbance from this system is considerably less than with highlead yarding.

Helicopter yarding has not been used extensively in southeast Alaska because it is relatively costly. Interest increases when log values increase, the supply of logs decreases, or minimum site disturbance is desirable. Units planned for helicopter yarding will be offered when market conditions provide adequate log value to cover the increased cost of helicopter yarding.

Tables 3-56 through 3-58 show acres proposed by yarding system and VCU. Skyline yarding is proposed for 61 to 73 percent of the acres; highlead yarding for 12 to 26 percent of the acres; helicopter yarding for 6 to 9 percent of the acres, and shovel yarding for 5 to 8 percent of the acres.



Table 3-56

Acres by Harvest System for Alternative 2

VCU	Shovel Loader	Highlead	Gravity Skyline	Running Skyline	Slack-line	Helicopter	Total Acres
398	0	0	0	0	0	0	0
399	14	68	0	360	0	52	494
400	33	0	0	300	0	180	513
401	0	0	0	0	0	0	0
402	92	136	0	425	0	176	829
416	0	0	0	0	0	0	0
417	0	0	0	0	0	0	0
418	0	0	0	0	0	0	0
419	40	135	0	337	0	0	513
420	72	714	0	986	0	0	1,771
421	19	43	0	558	0	23	642
Total	270	1,097	0	2,965	0	431	4,761
Percent	5.67%	23.04%	0%	62.26%	0%	9.03%	100%

Source: Gerdes, 1992

Table 3-57

Acres by Harvest System for Alternative 3

VCU	Shovel Loader	Highlead	Gravity Skyline	Running Skyline	Slack-line	Heli-copter	Total Acres
398	0	0	0	0	0	0	0
399	0	0	0	0	0	0	0
400	0	0	0	67	0	180	247
401	0	0	0	0	0	0	0
402	76	20	0	177	0	176	449
416	75	198	172	723	41	0	1,210
417	92	287	0	652	60	0	1,091
418	29	72	47	595	0	0	743
419	40	135	0	337	0	0	513
420	20	714	0	518	0	0	1,252
421	0	0	0	0	0	23	23
Total	333	1,426	219	3,071	101	379	5,528
Percent	6.02%	25.80%	3.96%	55.55%	1.82%	6.85%	100%

Source: Gerdes, 1992



Table 3-58

Acres by Harvest System for Alternative 4

VCU	Shovel Loader	Highlead	Gravity Skyline	Running Skyline	Slack-line	Heli-copter	Total Acres
398	0	0	0	0	0	0	0
399	14	68	0	360	0	52	494
400	33	0	0	300	0	180	513
401	0	0	0	0	0	0	0
402	92	136	0	425	0	176	829
416	47	7	35	263	41	0	393
417	92	306	0	652	60	0	1,110
418	29	72	47	566	0	0	714
419	40	0	0	230	0	0	270
420	13	0	0	225	0	0	238
421	19	43	0	558	0	23	642
Total	378	633	82	3,578	101	430	5,203
Percent	7.27%	12.17%	1.57%	68.78%	1.94%	8.27%	100%

Source: Gerdes, 1992

Proportion of Harvest Acres by Volume Class Strata

Table 3-59 displays the baseline proportion of volume class strata 6 and 7 existing in the North and East Kuiu Project Area, along with the projected proportionality of these volume class strata that would remain should a particular alternative be implemented. The change in proportionality displayed under Alternative 1 reflects past timber harvest that occurred in the MAs since passage of the TTRA. It should be kept in mind that the TTRA refers to volume harvested and not volume scheduled or planned for harvest. The final measure of compliance with the proportionality requirements of the TTRA will be based upon the actual location of the designated harvest units.

For MA S09, Alternatives 1, 2, and 3 are projected to meet the proportionality requirements of the TTRA. For Alternative 4 in MA S09 and all alternatives in MA S04, the projected remaining proportionality of volume class strata 6 and 7 is lower than that which existed in the MA at the time the TTRA was signed into law. Forest Service Handbook direction (FSH 2409.18, Region 10 Supplement No. 2409.18-92-5) (see Appendix M) allows for a departure of up to one-half of one percent (0.5%) from the original proportionality providing the difference can be made up in future timber offerings prior to the end of the long-term contract. An analysis of these future offering(s) must be documented in the Record of Decision and consider the following conditions:

- Sufficient volume remains in the MA to provide for scheduling of future long-term contract offerings.
- The volume remaining within the MA will meet planned direction for a feasible offering.
- The volume projected to remain within the MA at the end of the long-term contract term will meet the standard of proportionality that existed in the MA at the time the TTRA was signed into law.
- Harvest of volume from natural catastrophic conditions such as fire, insect and disease attack, or windstorm provided that the harvest will not preclude the opportunity to regain the existing proportion by the expiration of the long-term contract.



The Ten-Year Timber Sale Schedule for the Stikine Area projects an additional harvest of approximately 190 MMBF in these two MAs prior to the termination of the long-term contract. This provides ample opportunity to correct for the departure that may occur should any of the alternatives be implemented (see Appendix F). With the transportation network developed in the alternatives, the opportunity exists for adjustment of the proportionality deficits in both management areas during development of future NEPA processes. Actual layout of the offerings will also consider proportionality calculations and provide the opportunity to make minor adjustments to the proportionality deficit.



Table 3-59

Percent of Volume Class Strata Proportionality in Alternatives

	Timber Base (acres) ²	Volume Class Strata 6 & 7 (acres)	Proportion (%)	% Change from Original Acres ³
Management Area S04				
Original Mgt. Area Total	92,616	23,628	25.51	
Alternative 1 (No Action) ¹	- 750	- 270		
Remaining Mgt. Area Total	91,866	23,358	25.43	-0.09%
Alternative 2	- 3,107	- 945		
Remaining Mgt. Area Total	89,509	22,683	25.34	-0.17%
Alternative 3	- 1,454	- 500		
Remaining Mgt. Area Total	91,162	23,128	25.37	-0.14%
Alternative 4	- 3,107	- 945		
Remaining Mgt. Area Total	89,509	22,683	25.34	-0.17%
Management Area S09				
Original Mgt. Area Total	48,493	3,593	7.41	
Alternative 1 (No Action) ¹	- 934	- 16		
Remaining Mgt. Area Total	47,559	3,577	7.52	0.11%
Alternative 2	- 2,896	- 79		
Remaining Mgt. Area Total	45,597	3,514	7.71	0.30%
Alternative 3	- 5,330	- 367		
Remaining Mgt. Area Total	43,162	3,226	7.47	0.06%
Alternative 4	- 3,449	- 316		
Remaining Mgt. Area Total	45,043	3,277	7.27	-0.13%

Source: Gerdes, 1992

¹ The No Action Alternative displays the effect of harvest that has occurred since the passage of the TTRA (November 28, 1990). This is the acreage base for other alternatives.

² Timber base - to assess proportionality, each of the TLMP Management Areas must be updated to determine the volume currently represented (as of November 28, 1990) within each management area. As a matter of policy, this excludes all Wilderness, TTRA designated LUD II areas, and Class I and applicable Class II streamside buffer zones established by the Tongass Timber Reform Act. The total remaining old-growth (herein called the timber base) within each management area is considered for proportionality.

³ A negative % indicates volume class strata 6 and 7 proportionality has declined from the original % as determined at the time of passage of TTRA (Nov. 28, 1990). Regional policy allows for a negative change of up to 0.50% as long as it can be made up in subsequent NEPA proposals.

Regeneration

All stands proposed for harvest are planned for reforestation by natural regeneration within 5 years after yarding is completed. Artificial reforestation by hand planting nursery grown seedlings will be prescribed for stands which can not be certified as adequately regenerated within 5 years after yarding.



Precommercial Thinning

All stands proposed for harvest are planned to be precommercial thinned approximately 20 years after yarding. Precommercial thinning is planned for all stands because ten years after harvest, most sites will have at least 3,000 trees per acre. The average cost per acre of precommercial thinning is estimated to be \$300 per acre. Precommercial thinning will maximize the growth potential of conifers and understory species. It will also maximize landscape biodiversity, maintain stand health, control species composition, and maintain big game wildlife forage. Precommercially thinned stands will reach a visually desirable condition in a shorter time.

Commercial Thinning

The stands proposed for harvest are not planned for commercial thinning. Growth of useable wood fiber could be increased by commercial thinning which would reduce conifer competition among trees in the stands. But, the silvicultural treatment is not considered because it has not been proven to be economically viable due to operational, site, and silvicultural constraints. Operational problems include high logging costs associated with yarding small, low value forest products. Site problems include the lack of anchors for securing yarding equipment and wet soil conditions. Stand problems include damage to residual trees and an increase of windthrow potential. Commercial thinning on some sites may be possible in future years as technology improves or forest product values increase.

Stand Growth and Yield

Sawlog quantity from the younger managed stands will be significantly higher than was found in the harvested stands due to less defect and greater trees per acre. Sawlog quality of the trees will be lower than in mature and over-mature stands. The primary reason will be due to the greater amounts of knots in the lower logs for the younger, smaller trees.

Projected Harvest Through Year 2011

A life of the sale plan was completed 12/17/82 to project the reasonably foreseeable harvest to 2011 when the contract ends. The analysis associated with this Life of the Sale Plan has served as the foundation for estimating cumulative effects for this EIS as well as developing the current 10-year sale schedule for the Stikine Area and the Sale schedule displayed in the Supplemental DEIS for the TLMP Revision. Projected harvest was estimated by analyzing TLMP data for VCU's in the long term sale area allowing timber harvest (LUDs III & IV). Information from the original analysis has subsequently been updated to incorporate effects of TTRA legislation and land exchanges resulting from ANILCA legislation. The purpose of determining a projected harvest is to provide information to analyze reasonably foreseeable effects rather than to begin planning actual harvest units. Units harvested through 2011 will be analyzed for site-specific impacts in similar future planning efforts.



The alternatives considered on Kuiu Island at this time together with past timber harvest associated with the APC long-term sale and the various independent timber sales are different ways to achieve part of the projected harvest.

Figure 3-8 displays the percent of operable commercial forest land which will be harvested by the year 2011 for each Management Area in the project area. Harvest would range from a low of 17% of the operable CFL in VCU 401 to a high of 43% of the operable CFL in VCU 402.

Tongass Timber Reform Act

The cumulative effects of the TTRA legislation are threefold:

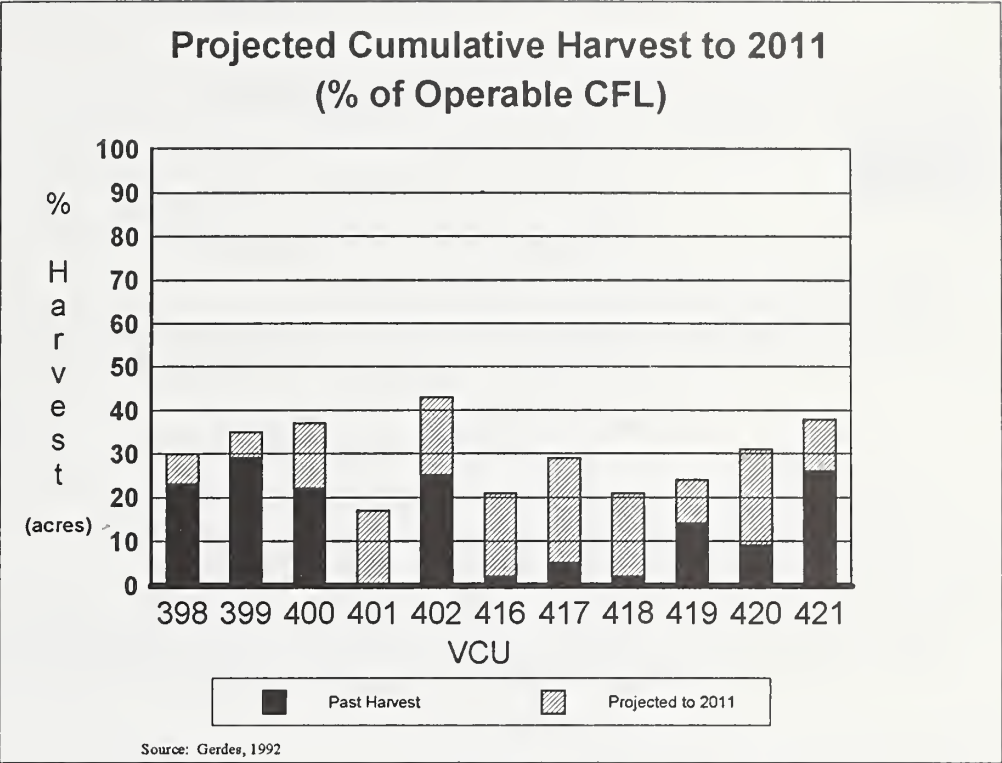
1. Class I and II stream buffers mandated by the Act.
2. Volume class 6 and 7 proportionality requirements.
3. Additional Wilderness and LUD II land allocated by the Act.

The North and East Kuiu Project Area was effected by reallocation in only one instance; that of Conclusion Island, a small island on the east side of Kuiu Island that did not have volume included in any of the North and East Kuiu alternatives.

The effect of mandating buffers on Class I and II streams is expected to be minimal as the original AHMU Handbook guidelines prescribed variable width buffers on a site-by-site basis. It was estimated that on the average, 80% of Class I, 60% of Class II, and 10% of Class III streams would be unavailable to timber management using the original AHMU guidelines.

The effect of the proportionality requirement is to increase the overall number of acres that will be harvested by the end of the APC contract slightly in MA S04 but decrease it slightly in MA S09. The net effect is that cumulative harvest projected by the assumptions used for the Life of Sale analysis is not significantly changed by the proportionality requirement of TTRA.

Figure 3-8





Visual Resource

Affected Environment

The study area is accessible by a variety of marine travel routes: Chatham Strait to the west, Frederick Sound to the north, Keku Straits/Rocky Pass to the east and Sumner Strait to the south. Numerous bays provide both marine and visual access to the island.

North Kuiu Island has been extensively harvested beginning in the early 1960s with the independent timber sale program in Saginaw Bay. In 1972, Kuiu Island became the contingency area for the APC Long-Term timber sale contract, and visual condition and appearance reflect the demands of and requirements of the contract. Southeast Kuiu exists in a relatively pristine condition, with a minor amount of A-frame harvest units visible from the saltwater. The Three Mile Arm area, however, has visible evidence of recent timber harvest.

Visual Management System

The Forest Service has developed the Visual Management System as a framework for inventorying the scenic resources and providing measurable standards for their management. The components of this system are sensitivity levels, variety classes, and distance zones.

Sensitivity Levels

Sensitivity levels provide a method to measure the importance of viewed landscapes, and reflect concerns of persons viewing the landscape. Sensitivity Level 1 areas are typically high use roads or trails, Alaska Marine Highway routes, tour ship routes, frequently used marine travel routes, campgrounds, or developed recreation sites visited by persons with a moderate to high degree of concern for scenic quality. Sensitivity Level 2 travel routes or use areas are those which receive less use, with the viewer having a moderate degree of concern for visual quality. Sensitivity level 3 areas are not seen from any of the above areas and receive the least use along travel routes or other areas.

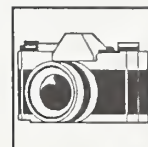
Marine travel routes associated with Kuiu Island are primarily Sensitivity Level 2 routes. These include: Rowan, Security, and Saginaw Bays, Port Camden, Three Mile Arm, Seclusion Harbor and Salt Lagoon, No Name Bay, and Reid and Alvin Bays. These areas receive intermittent to moderate use over the course of a year. Much of the use is seasonal in nature. Recreation use in the area is increasing, with the National Outdoor Leadership School (NOLS) using the area for their one and two week long kayak courses. Dispersed recreation use occurs primarily in the summer and is usually marine related.

Variety Class

Kuiu Island is within the Kupreanof Lowland landscape character type. There are six Visual Character Types on the Tongass, and they provide a frame of reference for the variety class inventory. Each character type has unique features, many of which increase the scenic quality and interest of the area. **Class A** landscapes have outstanding or unusual features of land-

form, vegetative patterns, waterforms or geologic features. **Class B** landscapes are common throughout the character type with no outstanding features. **Class C** landscapes have minimal variety in form, line, color or texture.

In this analysis area, landscapes are predominantly Class B or Class C. Class A landscapes are present outside Rowan Bay (north of the Bay of Pillars), at the head of Port Camden and in the Salt Lagoon area near Seclusion Harbor.



Distance Zones

The third step in the inventory process is the distance zone mapping. Foreground areas are those seen from the viewer to one-quarter to one-half mile away. Middleground areas are seen from the foreground to three to five miles. Background areas are those seen from three to five miles to infinity.

Visual Quality Objectives (VQOs)

These three elements: sensitivity levels, variety classes and distance zones, are then combined to form Inventory Visual Quality Objectives (VQOs) which are: Retention, Partial Retention, Modification and Maximum Modification. Visual Quality Objectives provide measurable standards or objectives for managing the visual resource and are based on public concern for scenic quality (sensitivity levels), the diversity of natural features in the landscape (variety class), and the distance from which the landscape is seen (distance zones).

Table 3-60 illustrates by VCU acres of each Visual Quality Objective. Visual Quality Objectives will be referred to throughout the analysis and have been used in the planning process to define the theme of each action alternative.



Table 3-60

Acres of Inventoried Visual Quality Objectives

VCU	Inventory Visual Quality Objective			
	Retention	Partial Retention	Modification	Maximum Modification
398	437	1,510	6,394	4,990
399	0	4,122	17,938	3,703
400	1,202	5,811	15,209	6,566
401	9,926	3,972	47	0
402	139	6,354	15,181	10,930
405.1	61	147	438	1,078
416	0	3,079	8,991	4,195
417	0	1,700	3,909	4,721
418	997	2,944	2,005	3,752
419	0	5,990	6,477	7,001
420	21	7,306	11,318	14,890
421	2,436	4,688	7,781	19,219
Total Acres	15,219	47,623	95,688	81,045

Source: Buschmann, 1992

Existing Visual Condition (EVC)

One of the ways of describing the visual resource is through what is known as the Existing Visual Condition inventory. This is a nationally developed and recognized system of describing the current condition of the forest landscape. The inventory was updated in June 1991 and reflects development activities up to and including most of the 1991 operating season.

Another role of the EVC inventory is to provide the land manager a "picture" of the forest. Defined by numerical ratings, the visual condition of the activity could range from Type 1 (natural condition, where no development has occurred) to Type 6 (major visual disturbance). The following table illustrates the degree of change to date by VCU for the analysis area. Refer to the glossary for EVC definitions.

Table 3-61

Existing Visual Condition (in acres)

VCU	Type I	Type II	Type III	Type IV	Type V	Type VI
398	9,594	236	5	1,344	2,152	0
399	11,793	258	819	195	11,188	1,510
400	16,685	38	39	2,533	5,500	3,993
401	13,840	0	105	0	0	0
402	16,421	0	231	1,293	14,313	346
405.1	1,724	0	0	0	0	0
416	15,396	192	363	314	0	0
417	9,037	0	0	1,293	0	0
418	9,205	0	0	432	61	0
419	11,911	281	359	860	6,057	0
420	27,834	29	187	758	4,208	519
421	12,927	0	0	396	20,801	0
Total	156,367	1,034	2,108	9,868	64,280	5,918
Percent	65.3%	0.4%	0.9%	4.1%	26.8%	2.5%

Source: Buschmann, 1992

From this table, it is apparent that VCUs located on north Kuiu (399, 400, 402, 419, 420 and 421) have timber harvest activities which dominate the characteristic landscape (EVC Type V and VI). On the other hand, VCUs 401, 405.1, 416 and 418 exist primarily in an unmodified visual condition (Type I, ecological change only). VCUs 398 and 417 have a moderate degree of activity in almost all EVC settings.

Summary of the Visual Design Process

As previously described, there are ten general areas or viewsheds where visual resource concerns are high. Management activities proposed in the action alternatives could be visible to people from a variety of vantage points, from watercraft, aircraft, ground vehicles or on foot. The landscape architect on the interdisciplinary team (IDT) was involved in the design of harvest units in some of these areas of high visual concern. Areas were analyzed from the multi-entry layout perspective, taking into account past timber harvest and the texture associated with a regenerating stand. Depending on the VQO of the area and the future design scheme, future harvest would not occur until stands have regenerated to meet the long-range multi-entry objective.

Since publication of the DEIS, numerous design changes have been made to specific harvest units. Units have also been dropped to make the alternatives consistent with their themes. Following is a brief summary of these changes:



	Alternative 2	Alternative 3	Alternative 4
Number of Units Dropped	1	11	3
Number of Units Redesigned	8	7	15

The design process is reiterative in the sense that the IDT works and re-works unit design and location to meet a variety of objectives. For example, the units proposed on the north side of Rowan Bay (all action alternatives) were designed to relate to the naturally occurring patterns on the landscape (vertically oriented chutes and slides). Soil stability was also a concern in this area; minimizing potential for soil disturbance was integrated as a design element.

This is one example of how visual resource concerns are integrated in project planning. Other methods include:

- Prescribing helicopter yarding of small openings (as in Unit 399-19)
- Working with the transportation planner to avoid road construction in areas of high visual sensitivity
- Limiting quarry development in areas visible from sensitive travel corridors (marine or land-based).
- Use of Perspective Plot software. This provides a simulated depiction of the alternative's visual impact and gives the IDT and the decision maker a "preview" of the harvest unit's appearance.

Landscape Characteristics by VCU and Visual Change by Alternative

Following is a brief description of each VCU, including a discussion of its landscape character, degree of use and the sensitivity of the users, and its current visual condition. The effects of each alternative are described following the description of the current situation; providing the reader a comparative analysis by VCU. The No Action Alternative (Alternative 1) is not addressed as the visual condition of the area would not be altered by management activities. Development would be deferred, maintaining the current visual condition of the study area.

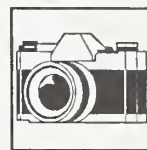
KEKU ISLETS (VCU 398)

The landforms in this area are low lying and visually dominated by the Keku Islets. These small islands are scattered along the shoreline to approximately 4 miles and provide spacial variety as the traveler moves through the area. When viewed in conjunction with the rugged background mountains of Admiralty and Baranof Islands, these islets offer spectacular scenery for the recreationist. Areas seen from Kadake Bay (VCU 421) are of high visual sensi-

tivity and are visible within one half mile by persons accessing the Kadake Bay United States Forest Service (USFS) recreation cabin.

Alternatives 2, 3, and 4:

No activities are planned in this VCU, development is deferred at this time. The characteristic landscape will be maintained in its current condition.



SAGINAW BAY (VCU 399)

Landscapes on the east side of this bay are broken and irregular in vegetation and topography. On the north side of Halleck Harbor, a Tlingit rock painting provides visual interest and is an attraction for the marine recreationist. This VCU has been extensively harvested, primarily in the southern reaches of the bay. The once active log transfer facility on the west side is currently inactive, and could be used in the future if necessary. Evidence of past activity adjacent to the facility has been removed and/or rehabilitated.

Alternatives 2 and 4:

Activities proposed in these alternatives are identical and have similar visual consequences. Eight units are proposed, four of which will not be seen from Saginaw Bay. The remaining four units have been designed to meet the inventoried VQO of Modification. The design of Unit 399-19 will meet the Partial Retention VQO as seen from Saginaw Bay and Frederick Sound. The use of helicopter yarding will allow for harvest prescriptions designed to mimic naturally occurring patterns found in the landscape.

Alternative 3:

No activities are planned in this VCU, development is deferred at this time. The characteristic landscape will be maintained in its current condition.

SECURITY BAY (VCU 400)

The landforms on either side of this bay are viewed by fishermen, hunters, recreationists and a private residence located on the east side of the bay. Generally, Security Bay is of higher sensitivity than the other bays on North Kuiu. This is due to the State of Alaska Marine Park located on the east side of the bay, the high subsistence value and use by the Kake community, and its use by recreational and commercial fishing operations.

In his report prepared for the 1971-1976 planning period, Landscape Architect, James E. Knode wrote the following about Security Bay. These words best portray the feel and quality provided by the environment found in Security Bay:

- "Spatially, the inner lagoon and the remainder of the valley to the south are well defined by steeply rising slopes on all sides. From the lagoon itself, landscapes are viewed principally as foreground elements. Although recreational use now takes place and will probably continue to take place on the valley floor, retention of adjacent uplands in an un-altered state is essential if this exceptional area is to retain its attractiveness for such activity."

The landscapes associated with these areas consist of rolling terrain with topographic relief varying from 1,000 to 3,000 feet. The area is largely covered with hemlock/spruce forests, with interspersed mountains and summits serving as focal points.



Alternatives 2 and 4:

Harvest is identical in these two alternatives and have similar visual consequences. Following additional site specific analysis and in response to public comments received on the DEIS, Unit 400-8 has been redesigned to minimize visual impacts as seen from Security Bay. The middle two settings of Unit 400-8 were deleted, creating two separate units (400-8 and 400-21), which now work with characteristic landscape features and meet the visual objective. From the viewpoint of the marine-based traveller, changes in the landscape will be obvious; yet activities have been designed to be consistent with the theme of the alternative.

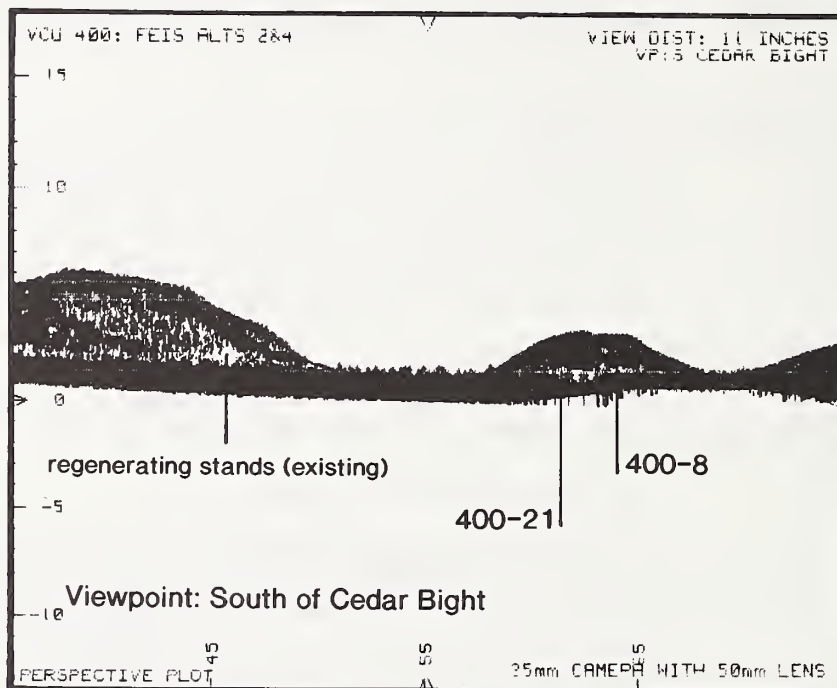


Figure 3-9 Graphic depiction of Units 400-8 and 21 as seen from Security Bay

Alternative 3:

The five units in this alternative would meet the inventoried VQO. Four of the five would be visible in the middle to background distance. The remaining unit (400-12h) would not be seen from saltwater.

WASHINGTON BAY (VCU 401)

The area north of Washington Bay is viewed from Chatham Strait by passing cruise ships in the middle to back ground distance. Commercial fishing vessels and the marine recreationist view the steep terrain in the fore to middle ground distance. These landforms rise steeply from salt water increasing the overall visibility of the entire landscape. Washington Bay pro-

vides a safe anchorage during inclement weather, yet receives little use, as weather conditions prevent access and ability to safely travel Chatham Straits in small water craft. This VCU is predominantly natural in its visual condition. Older harvest activities have regenerated to where they are not evident to those travelling Chatham Strait.

Alternatives 2, 3, and 4:

No activities are planned in this VCU, development is deferred at this time. The characteristic landscape will be maintained in its current condition.



ROWAN BAY (VCU 402)

A variety of activities and operations occur within Rowan Bay. Some of them are: log raft construction, storage and removal; commercial Dungeness crab and seine fishing operations; camp resident recreation, fishing and crabbing; and infrequent recreational mariners. The north side of Rowan Bay is visually dominated by Rowan Peak, which reaches an elevation of 3210 feet. Alpine slopes are scattered with isolated stands of timber, and provide a distinctive landscape setting as seen from the bay or Chatham Straits.

Outside and to the north, avalanche chutes 20-30 years old are evident, with exposed white rock on the upper reaches attracting the viewers eye. This landform is complex in its steep, incised notches and steep valleys facing onto saltwater. This area exists in its pristine visual condition.

The south side of Rowan Bay has been visually impacted by two harvest units (1986-90 SEIS ROD) and their associated roads. These units dominate views from the camp, airplane float and Rowan Bay in general. Landforms at the head of Rowan are viewed in the middle to background distance. Past harvest activities are evident, but don't dominate the seen area due to the far viewing distance and age of the regenerating stand.

Alternatives 2 and 4:

Harvest activities proposed in this VCU have been designed to work with naturally occurring features found in the landscape. Avalanche chutes and vertically oriented openings are visible from Rowan Bay when looking north. Units 23 to 33 have been designed to minimize their dominance on the landscape and work with these features. Unit 45 on the south-east side of Rowan Bay is designed to work with natural features as well as the existing harvest unit located to the west. The remaining units are located in areas with an inventoried VQO of maximum modification and will not be evident from sensitive travel routes or use areas. Since the DEIS, Unit 402-29 has been redesigned to reduce impacts to soils moving the unit further upslope from its original location. This unit change maintains the original intent of the unit design.

Alternative 3:

Although there are fewer units in this alternative than in Alternatives 2 and 4, change in the visible landscape is the same. Units not included in this alternative are not seen from saltwater or sensitive viewpoints.

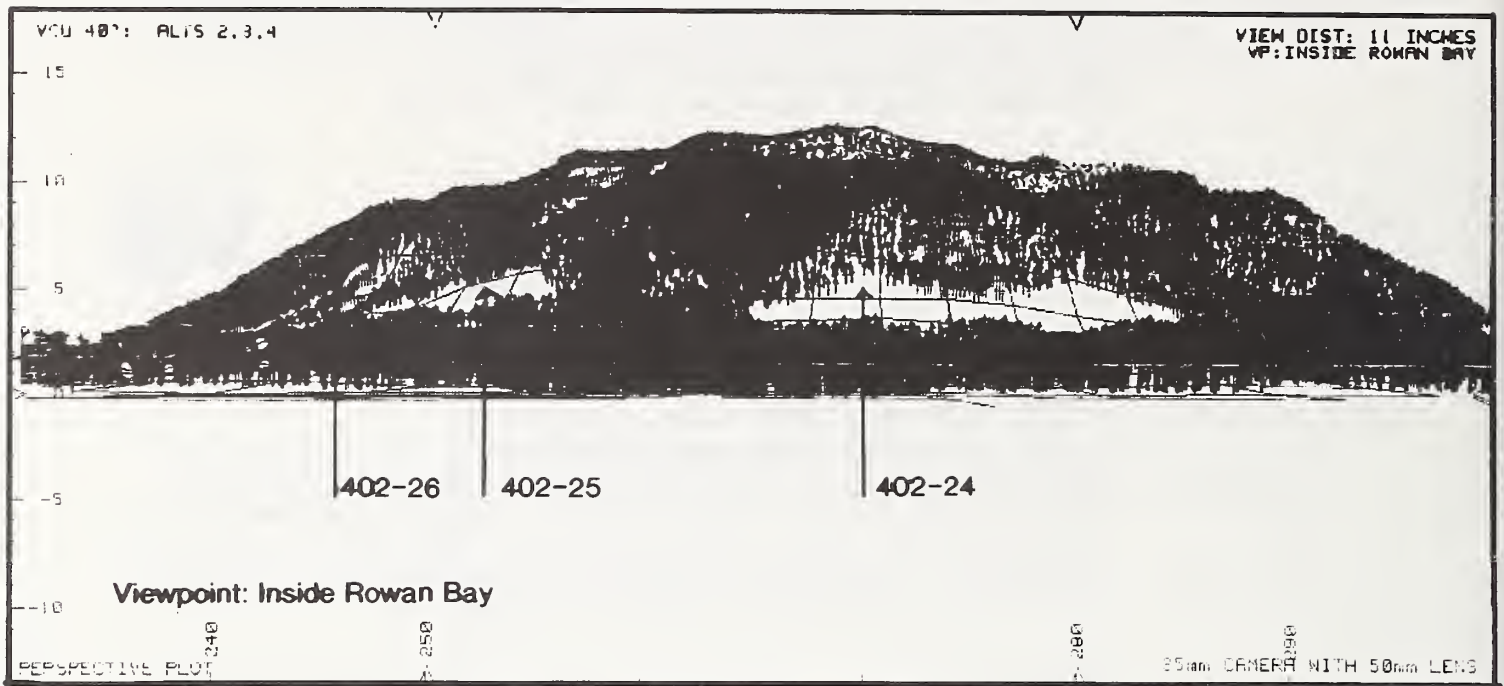


Figure 3-10 Graphic depiction of harvest proposed in Alternatives 2, 3, and 4 as seen from inside Rowan Bay

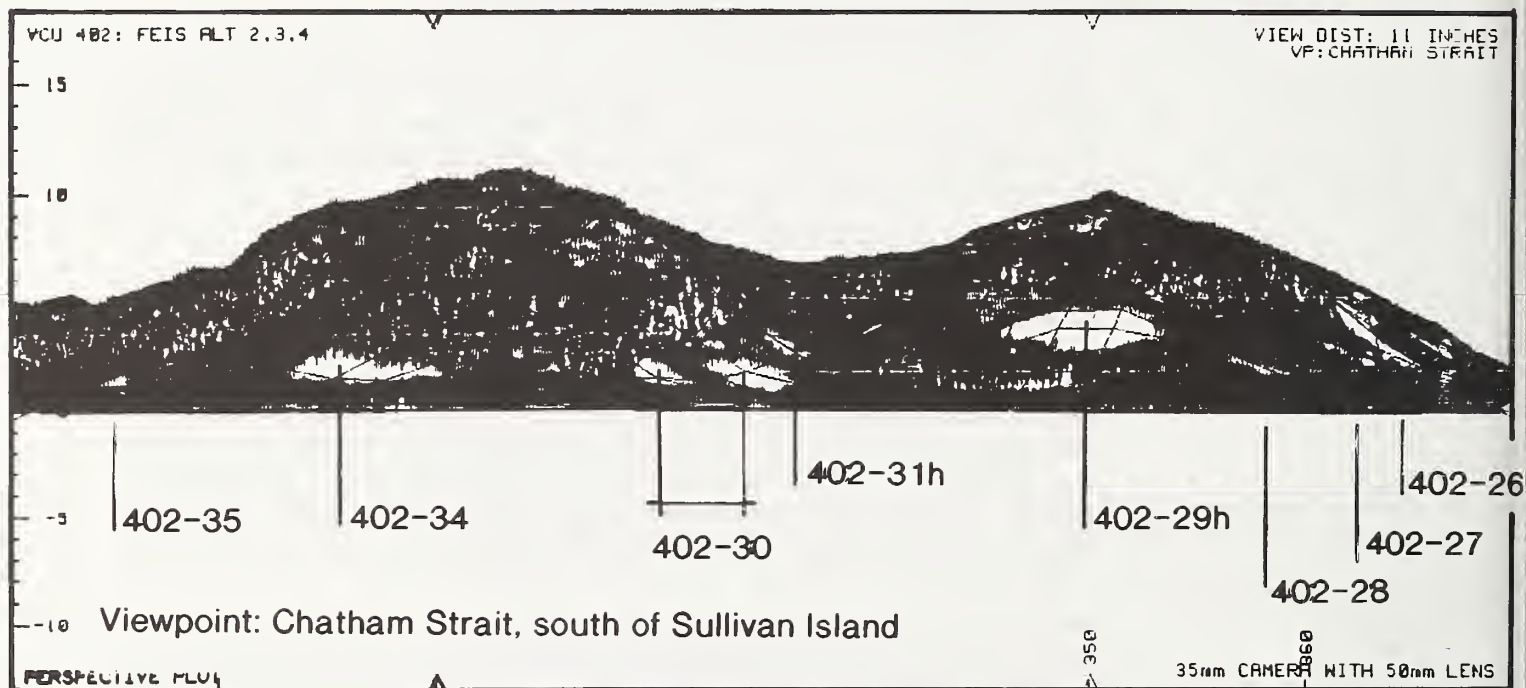
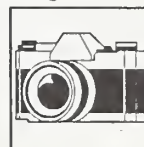


Figure 3-11 Graphic depiction as seen from Chatham Strait

ALECKS LAKE (VCU 405.1)

Landscapes adjacent to Alecks Lake (VCU 405.1) are gently rolling seen as middleground from Alecks Lake. The area receives little use by recreationists and provides roading options for the southeastern end of Kuiu Island.



Alternative 2:

No activities are planned in this VCU, development is deferred at this time. The characteristic landscape will be maintained in its current condition.

Alternatives 3 and 4:

The 6402 road will be present providing access to east Kuiu. Areas outside the road corridor would evolve naturally, consistent with its LUD II designation. Additional mitigation measures for the visual and recreation resources have been included on the road card (see Appendix A).

ALVIN AND REID BAYS (VCU 416)

This VCU contains Alvin and Reid Bays. Alvin Bay is fairly well protected and is a good anchorage with over a mile of beach on the north side. Reid Bay appears to be undisturbed by man and is open in character with three distinct "arms". The general visual character of the VCU is that it is a very common scene to Southeast and is not outstanding in any aspect. Viewpoints are most commonly from the water and attention is confined to the shoreline and islands in the foreground. Forested hills dominate the middle to background distance.

Alternative 2:

No activities are planned in this VCU, development is deferred at this time. The characteristic landscape will be maintained in its current condition.

Alternative 3:

Activities proposed in the Alvin and Reid Bay area have been modified since the release of the DEIS. This is in response to public comments as well as ensuring that the proposed activities are consistent with the theme of the alternative--meet the inventoried VQO. Seven units were dropped from the DEIS alternative and Unit 416-30 was redesigned to meet the Modification VQO. In this unit, a small patch of timber was left in the opening to create visual diversity, and the lower edge of the unit was reshaped to work with characteristic landscape features.

Alternative 4:

Development in this alternative would be limited to the northern, interior portions of the VCU. All seven of the units, as planned, would meet the inventoried VQOs.

NO NAME BAY (VCU 417)

This VCU has two distinctly different areas: the outer or eastern portion is spacious, unprotected and open in character, while the inner area is scattered with islands and fairly protected. Viewed almost exclusively from the water, the landscapes in this VCU are those common to southeast Alaska. The beach fringe, shoreline and small islands are the most significant landscapes in the area. On the southern side of the bay there is evidence of past timber harvest.



Alternative 2:

No activities are planned in this VCU, development is deferred at this time. The characteristic landscape will be maintained in its current condition.

Alternatives 3 and 4:

Activities proposed in these alternatives are identical and would have similar visual consequences to areas seen from No Name Bay. Since the DEIS, three units have been redesigned to address public comments and meet the visual objective. Units 417-1, 3, and 13, have been reshaped and scaled back in size to work with features found in the landscape. The upper settings of Unit 417-3 were dropped to minimize impacts to soils and visual impacts as seen from the Aleck's Lake canoe/kayak portage. The figure below is a computer simulation of the new unit design for 417-13. The unit was redesigned to mimic the natural condition with areas of reserve trees left in the steeply sloped areas. Unit 417-9 was dropped from these alternatives to minimize visual impacts as seen from no Name Bay and to maintain wildlife habitat.

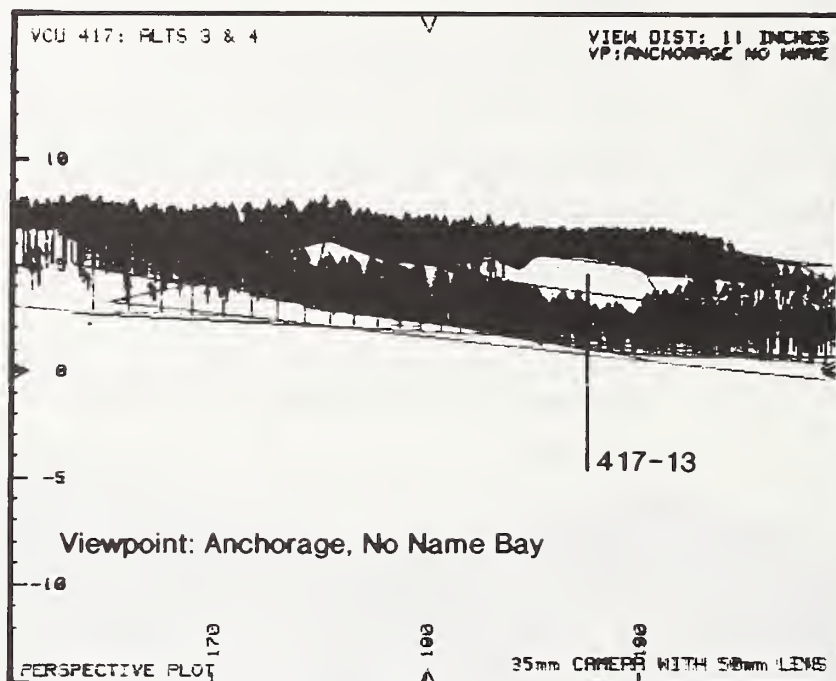


Figure 3-12 Graphic simulation of Unit 417-13 as seen from the anchorage near "Fantasy Island".

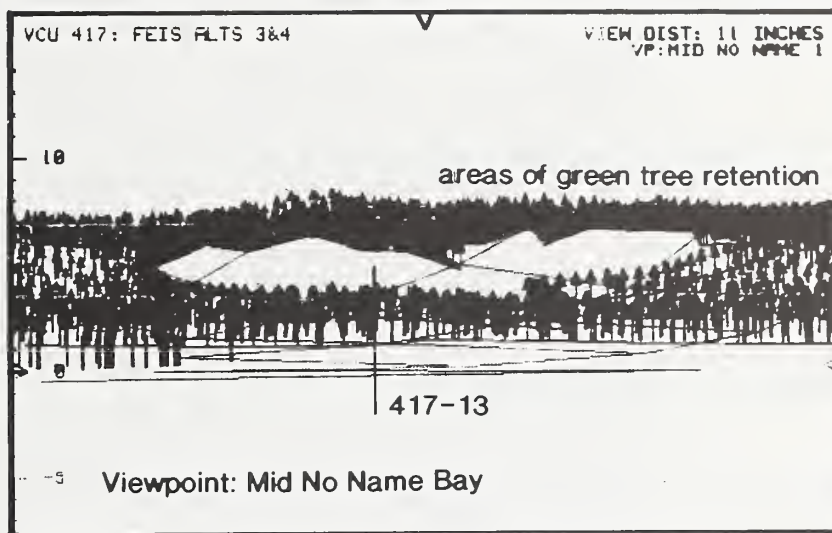


Figure 3-13 Graphic simulation of Unit 417-13 as seen from the middle of No Name Bay

SALT LAGOON (VCU 418)

This is a protected bay with a marginal anchorage and provides access to the Salt Lagoon (rated high visual sensitivity) which is a salt chuck. Overall, the area is fairly common visually, but the characteristics of the salt chuck from a biological, geological and recreational standpoint, makes it an important attraction to visitors with a higher expectation regarding the visual setting. Access by boat is limited by tidal conditions, as it goes dry at low tide. The area is rated Sensitivity Level 1, which resulted in an Inventory VQO of Retention to the areas surrounding the salt chuck, lagoon and inner portion of Seclusion Harbor. Past activities (two older tractor units) have regenerated to the point where they are no longer evident to the forest visitor.

Alternative 2:

No activities are planned in this VCU, development is deferred at this time. The characteristic landscape will be maintained in its current condition.

Alternatives 3 and 4:

Activities proposed in these alternatives are identical and would have similar visual consequences to areas seen from the Salt Lagoon and Seclusion Harbor. As approaching the Salt Lagoon, the marine traveller would see views of Units 418-14, 15 and 16; which would meet the inventoried VQO of modification. Turning west into the harbor, Unit 13 would be



obvious to the forest visitor and has been redesigned to meet the Modification VQO. Since the DEIS, Unit 418-2 has been modified to meet the VQO by dropping the uppermost settings, thereby minimizing its overall visibility as seen from the Salt Lagoon. The remaining units would be evident to the observer and, as planned, would meet the inventoried VQOs.

THREE MILE ARM (VCU 419)

The outer portion of the bay is wide and open, and narrows as one travels further into the bay. This inner area is closed, more protected and contains several attractive islands. Timber harvest, road construction and quarry development approved in the 1986-1990 Record of Decision are highly evident to those visiting Three Mile Arm. Work on the southwest side Three Mile Arm was completed in the summer of 1990, with activities on the north and east sides planned for 1991. The visual character of Three Mile Arm has changed dramatically over the last 2 years, and has left long term visual impacts which will require up to 35 years to recover.

Alternative 2 and 3:

The areas proposed for harvest are primarily inland (VQO is Maximum Modification) and is not seen from Three Mile Arm. Three of the 10 units are in areas inventoried modification VQO, and the remaining seven are in areas inventoried maximum modification. Since the release of the DEIS, Unit 419-29 has been redesigned to minimize its blocky shape and meet the Modification VQO.

Alternative 4:

Four units are proposed and would access areas north of the road system on the east side of Three Mile Arm. Since the release of the DEIS, Unit 419-29 has been redesigned to minimize its blocky shape and meet the Modification VQO. The remaining units also meet the Modification VQO.

PORT CAMDEN (VCU 420)

This area is predominantly used by commercial fishing operations as well as subsistence users originating from Kake. There is light recreational use of the area. Canoe portages have been constructed by the Forest Service, providing access from Three Mile Arm to Port Camden and from Port Camden to Bay of Pillars. These portages have been given a Sensitivity Level 1 rating, reflecting the high expectation of persons using these access routes.

The landscapes in this VCU vary from rolling forested hills to steeper canyon-like walls to snow-capped alpine peaks at the head of the bay. From the saltwater perspective, variety is also added as travelling through this 14 mile passage. The mouth spans 2 to 2 1/2 miles and narrows to 1/2 mile or less with steep hillsides adjacent to the water's edge. Past timber harvest is dominant as seen from the head of the bay, near the isthmus to Three Mile Arm and the north side near the isthmus to Bay of Pillars. The peak located furthest south is unique, as it provides views of alpine country, with waterfalls and avalanches cascading to lower elevations.

Alternative 2:

Activities proposed in this alternative would alter the visual condition of Port Camden's eastern peninsula. Currently unroaded, this alternative would develop much of the foreground and middleground seen area; with activities dominating the characteristic landscape. Past

harvest on the west side of Port Camden was designed to minimize visual impacts and meet the modification VQO. Since the DEIS, Units 420-46 and 47 have been redesigned to meet the modification VQO and work with characteristic landscape features. Units 420-23, 39, 46, and 49, have also been redesigned to meet the visual objectives. Units 420-15 and 17 would have negative visual impacts greater than what is acceptable in the Modification VQO setting. However, this is acceptable within the theme of this alternative.



Alternative 3:

This alternative is very similar to Alternative 2. The major difference is the dropping of Units 420-15 and 17 to meet the theme of this alternative. West Port Camden would remain in its current visual condition. Units 420-23, 39, 46, and 49 have been redesigned to meet the intent of the visual objective.

Alternative 4:

Activities proposed in the alternative would extend development on the west side of Port Camden only. Since the DEIS, Units 420-46 and 47 have been redesigned to meet the modification VQO and work with characteristic landscape features.

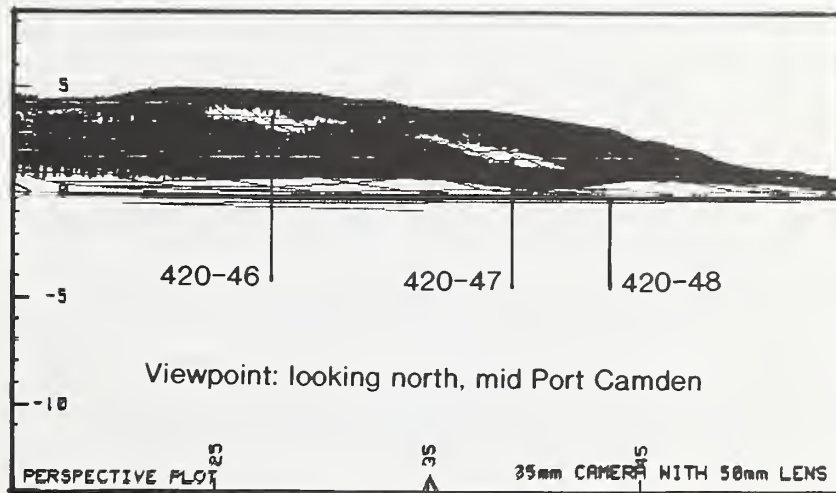
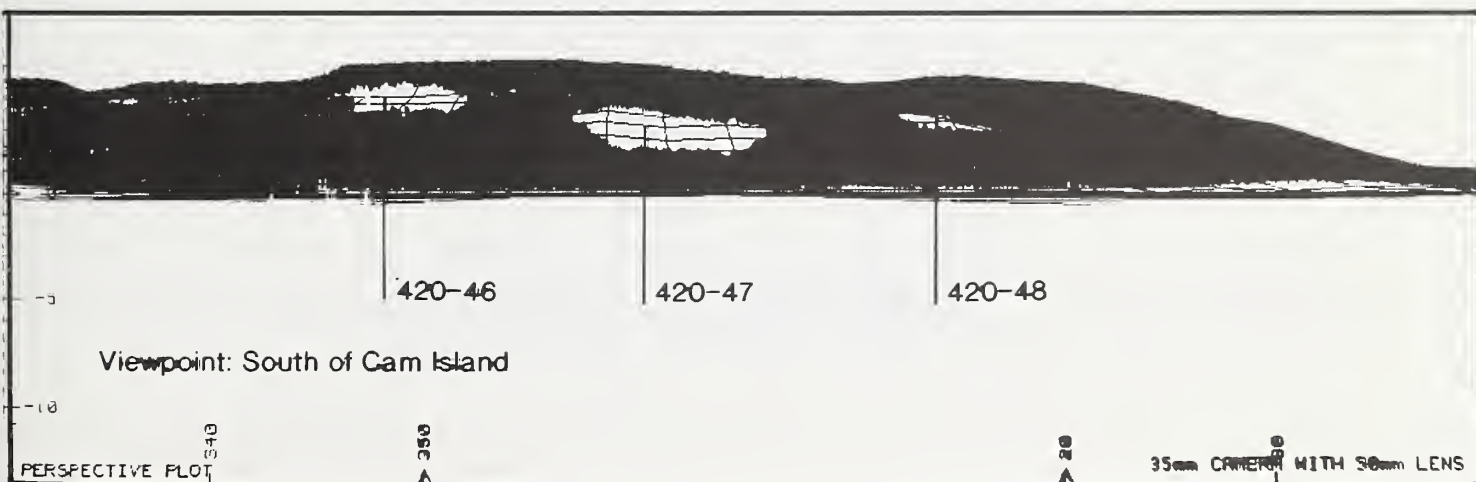


Figure 3-14 Graphic simulations of Units 420-46, 47, and 48 as seen from two different viewpoints in Port Camden.





KADAKE BAY (VCU 421)

This area receives moderate to high use by residents of Kake for subsistence fishing purposes. Landscapes in this area are typical of those on Kuiu Island. Entering the bay, the traveller passes through a 1,300-foot opening that expands to 1.5 miles wide once inside the bay. The Kadake Bay Forest Service cabin is located on the south shore of the bay. Views in the area are expansive, and there is evidence of past timber harvest in the Kadake Creek area. The tideflats are a dominant feature, and visitor access is determined by the rise and fall of the tides.

Alternatives 2 and 4:

Development proposed in this alternative would not be evident to most users of Kadake Bay or the Kadake Creek area. Since the DEIS, Unit 421-47 was dropped to maintain the eligibility of a small section of Kadake Creek as a Wild River. Unit 421-52 will be apparent from Kadake Bay, and after further unit design review, it was determined that the unit will meet the VQO of Partial Retention.

Alternative 3:

Only one unit is proposed in this alternative, and it will not be seen from salt water.

Future or Expected Visual Condition

The Existing Visual Condition (EVC) of the study area was previously described in the affected environment section. To evaluate each action alternative, an assessment was made of the visual consequences of the alternative using visual condition types. Alternative 1 displays the current visual condition of the study area. Alternatives 2 through 4 illustrate the visual condition that would result with the implementation of the alternative. The existing visual condition types are described in the Glossary.

Table 3-62

Acres of Future Visual Condition to be Achieved

Visual Condition Types	Alternatives			
	1 Current Condition	2	3	4
I	156,367	147,305	133,233	137,499
II	1,034	1,034	1,169	1,169
III	2,108	3,380	2,905	3,531
IV	9,868	14,061	15,952	16,576
V	62,280	67,311	79,517	74,747
VI	5,918	6,484	6,799	6,053

Source: Buschmann, 1992

Summary of Environmental Effects

The three action alternatives would have varying degrees of impacts to the landscapes of Kuiu Island. Concentrating harvest on North Kuiu, Alternative 2 would primarily develop areas previously harvested. The exception is Port Camden (VCU 420), where proposed activities on the eastern peninsula would dominate the visual condition of that area. Alternative 3 would have the most impact to the landscapes of Kuiu Island. Developing both the Port Camden area as well as the Kuiu's east side, this alternative would have the greatest cumulative visual impact of all the alternatives. Alternative 4 spreads harvest over both North and East Kuiu, and defers harvest on the east side of Port Camden. Activities proposed in No Name Bay are at the same level as proposed in Alternative 3, however those proposed in Alvin and Reid Bays are limited and would not have the same cumulative visual effects as in Alternative 3.



Alternative 1

Alternative 1 (No Action) would benefit the developed landscapes of north and east Kuiu Island by allowing further regeneration to occur, allow those landscapes in visually sensitive areas which are currently dominated by timber harvest activities. The landscapes of east Kuiu Island (where currently in a natural condition) would be deferred from development maintaining the landscape's visual condition and scenic quality as seen by marine recreationists.

Alternative 2

Generally, activities proposed in this alternative would be consistent with the overall theme as described in Chapter 2. Concentrating harvest activities on the north end of Kuiu Island further develops an already visually altered series of landscapes. The greatest visual disturbance would occur in the east side of Port Camden (currently unroaded), where units 420-15 and 17 would not meet the inventoried VQO of Modification. However, this is consistent with the theme of the alternative, which allows for activities to meet conditions consistent with the maximum modification VQO setting. Since the publication of the DEIS, eight units were redesigned and one was dropped from this alternative to be consistent with the theme of this alternative.

Alternative 3

This alternative would develop the east side of Kuiu Island, constructing a log transfer facility in No Name Bay. Landscapes around the Salt Lagoon, No Name Bay, Alvin and Reid Bays would be visibly altered in this alternative. In summary, since the publication of the DEIS, seven units were redesigned and eleven units were dropped from this alternative to meet the inventoried VQO and respond to comments received from the public.

Alternative 4

One of the objectives of this alternative is to spread future harvest over North and East Kuiu Island. In the alternative's description, activities were to be deferred in most visually sensitive areas where timber harvest currently dominates the seen area (EVC Type 5 or 6). This criteria would be met in all VCUs. Harvest is deferred in the east Port Camden area. Since

the publication of the DEIS, fifteen units were redesigned to minimize visual impacts and three units were dropped to be consistent with the alternative's theme.



Cumulative Visual Effects

The Tongass Land Management Plan provides extended rotations in areas of high visual sensitivity, adding mitigation for visual resource concerns in future planning. In areas presently allocated LUD 3, the normal rotation is extended to 200 years, more than double the standard rotation cycle. In areas allocated LUD 4, the rotation is 120 years, which provides a moderate degree of protection. The entire study area is presently allocated LUD 4.

The most intense visual impacts occur immediately following timber harvest. Impacts are typically most evident in the near to mid distances (foreground and middleground), and take 30 to 45 years to visually recover. Impacts associated with timber harvest may vary, and the degree depends upon ground conditions (slope and soil characteristics), viewing angle and orientation, as well as harvest unit design and distance between units (dispersion).

Following is a brief description of the reasonably foreseeable, cumulative impacts for each VCU in the study area.

VCU 398 Keku Islets

Full implementation of the Forest Plan allows for harvest activities which may be visible from Keku Straits. However, the landscape would not be dominated by harvest activities, reflecting the broken, irregular topography of the area.

VCU 399 Saginaw Bay

Past, present and future logging activities would result in a landscape dominated by openings of various ages, design characteristics and sizes. The Saginaw Bay area has been extensively logged over the years and its appearance reflects the intensity of these activities.

VCU 400 Security

The east side of Security Bay exists in a highly modified condition, and would continue to appear so until the year 2011. In the reasonably foreseeable future, the west side would be maintained in an unroaded condition which would reduce the likelihood of visual impacts as seen from the Security Bay Marine Park.

VCU 401 Washington Bay

Future development activities would be evident in areas seen from Chatham Strait and Washington Bay.

VCU 402 Rowan Bay

As entering Rowan Bay, the traveller currently encounters a landscape altered by timber harvest activities. Patterns established through clearcutting dominate the seen area, and would continue to do so through 2011. Management activities located on the north side of Rowan Bay would be visible, but would work with existing form and line found in the landscape.



VCU 403 Bay of Pillars

This VCU would be maintained in its current condition, reflecting its LUD II designation in the current Forest Plan. The visual condition of the landscape would remain unaltered.

VCU 405 Tebenkof Bay

The wilderness recreation experience, as seen from Aleck's Lake, would not be visually affected by the location of the road following construction. Existing vegetation screens the road from sight, as it has been located in an area of low lying topography.

VCU 405.1 Tebenkof Bay

This area is not open for timber harvest as it is allocated to a LUD I Release in the current Forest Plan. It also provides a recreational link from east Kuiu to the Tebenkof Bay Wilderness Area. A road accessing north Kuiu to east Kuiu could be constructed, and increasing potential for recreational as well as timber harvest activities on east Kuiu.

VCU 416 Alvin/Reid Bays

The landscape character of Alvin and Reid Bays would be visibly altered by timber and road construction activities. The contrast would be great, given the currently natural appearing condition of the area. Much of this VCU is varied in topographic character, and provides opportunities to minimize the apparent size of harvest activities through creative unit design using natural features.

VCU 417 No Name Bay

The landscape character of No Name Bay would appear in a modified condition; reflecting a concentrated level of harvest. Past harvest (1968) near the LTF would have visually recovered and would no longer dominate the views from No Name Bay. Much of the bay is managed by the State of Alaska.

VCU 418 Salt Lagoon

Harvest activities would be evident as entering Seclusion Harbor. Landforms seen from the Salt Lagoon would appear altered by timber harvest activities. Mitigation for visual impacts would be difficult, as the steep hillsides to the north provide little topographic variety to assist in absorbing harvest activities.

VCU 419 Three Mile Arm

The entrance to Three Mile Arm currently appears in a highly modified visual condition. Both sides of the bay, as well as the eastern portion of the VCU, have been recently harvested. The intensity of the harvest would be evident from all view points.



VCU 420 Port Camden

Management activities would be apparent throughout the VCU. Harvest activities located at the head of Port Camden and the east and west sides would dominate the landscape.

VCU 421 Kadake

Current and future timber harvest would be evident as seen from Kadake Bay and the Kadake Bay recreation cabin.

VCU 427/428 Rocky Pass

These VCUs would be maintained in their natural condition, reflecting its LUD II allocation in the current Forest Plan.

Watershed

Affected Environment



Streamflow

Kuiu Island annual precipitation, estimated from the USDA Forest Service Region 10 Water Resources Atlas, April 1979, ranges substantially: 80 inches on the north and west coast-lines; 140 inches on Rowan Mountain and the ridge west of Security Bay; and 160 inches near Threemile Arm. Steeply sloped watersheds prevail in the study area.

Primarily, heavy rainfall and limited water-holding capacity of steep watersheds determine the high number of perennial streams in the study area. Seasonal variations in precipitation include high streamflow in fall months, medium streamflow in summer, and low streamflow in winter and spring. While slopes rapidly shed water in warmer months, they moderate winter streamflow by holding precipitation as snowpack until snowmelt augments streamflow again in late spring.

Water Quality

Water quality on Kuiu Island is generally excellent and supports productive fisheries. Seasonal variations in sediment loads and stream temperature may impact fish habitat; management activities may increase these natural impacts.

Sediment

Sediment erosion, transport, and deposition compose a naturally-occurring sequence in watersheds and stream channels. Soil mass movement and stream channel instability often dramatically increase sediment loads.

Soil mass movement, discussed in the soils section of this document, is a prevalent erosion process on Kuiu Island. In November, 1988, landslides occurred near Saginaw Bay after heavy rainfall on the snowpack. Slide debris entered stream channels, increasing stream-borne sediment--rainfall and snowmelt produced high streamflows which in turn eroded stream channels, further increasing sediment loads. The landslides, unrelated to management activities, started above clearcuts; resulting high sediment loads and downstream impacts were natural events.

Sediment loads also vary according to stream channel characteristics. Stream substrate and gradient determine potential sediment transport and storage rates. Bedrock stream channels, which are the most stable, rapidly transport sediment. High energy streamflow in steep channels may transport large amounts of sediment. Steep stream channels--such as v-notch ravines--lack stability when deeply incised. Riparian vegetation and large woody debris contribute to channel stability and sediment storage. Large woody debris (LWD) creates pools, traps sediment, and provides fish cover and food. Abrupt removal of LWD--a prac-



tice associated with past streamside timber harvest and stream cleaning--initiated channel instability in some Kuiu Island streams. Kadake and Saginaw Creek tributary projects have replaced LWD to stabilize stream channels. Recent Browns Creek buffer windthrow--abrupt entry of large amounts of LWD--also initiated local channel instability. The site is monitored to evaluate fish habitat impacts.

Hydrologists use stream characteristics to classify (or type) and map study area streams; stream channel substrate, gradient, large woody debris, and riparian vegetation influence stream channel stability and sediment transport. Streams are then grouped into Process Groups with similar features as shown in Table 3-63 (Forest Service, 1992).

Table 3-63

Stream Process Groups

Floodplain Process Group:

Low gradient channels store large amounts of sediment.

Stability varies with substrate and floodplain material.

High quality anadromous fish habitat.

Alluvial Fan Process Group:

Low to moderate gradient channels periodically transport and store large quantities of sediment.

Unstable stream channels frequently change course.

Lower gradients and large woody debris support fish habitat.

Moderate Gradient Process Groups:

Streams readily transport sediment.

Stability dependent on bedrock, riparian vegetation or large woody debris

Often good quality fish habitat.

High Gradient Contained Process Group:

High-energy, primary sediment source streams rapidly transport large sediment loads

Bedrock frequently provides channel stability, but adjacent sideslopes are often unstable. Large woody debris may increase stability and store sediment, but may also form debris jams and initiate stream channel-scouring debris torrents.

Limited fish habitat.

Stream Temperature

Periodically, fish kills occur during salmon runs in many southeast Alaska streams. Studies link such kills to insufficient oxygen resulting from large concentrations of fish in warm, low streamflows. Streamside timber harvest, which allows more sunlight into stream channels, may elevate stream temperatures. However, no apparent correlation exists between timber harvesting and fish kills; kills occur in both harvested and unharvested streams (Alaska Working Group on Cooperative Forestry/Fisheries Research, 1991).



Summer stream temperatures on Kuiu Island range from 37 degrees to 52 degrees Fahrenheit, occasionally exceeding 60 degrees. Frequent cloudiness and precipitation, low air temperatures, and steep stream channel gradients maintain stream temperatures well within a range beneficial to fish. Fish kills have occurred in Rowan Creek, Browns Creek, Kadake Creek, Saginaw Creek, and Security Bay streams 109-45-17 and 109-45-10; these have not been specifically linked to timber harvesting. However, logging has taken place in all of these watersheds except 109-45-17.

Cumulative Watershed Effects

This section describes a Sensitivity Index and User Values as indicators of a recommended Threshold of Concern, a model which estimates potential cumulative watershed effects. Watershed sensitivity (McCorison, et al, 1988) provides one method for estimating existing watershed conditions of the 72 ADFG-catalogued streams in the study area. Watershed sensitivity, in this case, is an index of potential sediment production in response to disturbance specifically associated with the cumulative effects of timber harvest and road construction.

A sensitivity index is calculated from GIS inventories of soil erodibility, slope, channel stability rating, and drainage density. For example, an erodible, steeply-sloped watershed containing many unstable stream channels possesses an inherent potential for high sediment production: therefore, a high sensitivity index is assigned. User values, based on ADFG information, are scaled to reflect the value of a particular watershed in providing anadromous fish habitat--a high user value indicates the importance of maintaining high water quality in that watershed.

The sensitivity index, when combined with the user value, recommends the maximum level of disturbance--timber harvest and road construction--within a watershed. This level, the Threshold of Concern (TOC), represents the percentage of watershed area which may undergo disturbance. For instance, a high user value coupled with a high sensitivity index recommends that a low percentage of disturbance takes place. Oppositely, a low user value combined with a low sensitivity index allows for a higher percentage of watershed disturbance. Watershed sensitivity assesses both pristine and disturbed watersheds.

Table 3-64 provides information relating to the Threshold of Concern for each ADFG-catalogued watershed in the study area. Column Alt 1 displays the existing percentage of "equivalent" watershed disturbance, adjusting actual disturbed acreage according to a recovery profile based on clearcut age and road use. A fifty-percent rate of recovery is assessed ten-year-old clearcuts. The recovery rate rises to seventy-five percent for twenty-year-old



clearcuts. Complete recovery occurs after thirty years. Two road classes appear in the disturbed-acreage figures. Intermittent roads are included in clearcut acreage. Main haul roads are excluded from the recovery adjustment.

Many study area watersheds reflect pristine or near-pristine conditions; currently, management activities do not substantially contribute to cumulative watershed effects. On the other hand, Kadake and Saginaw Creek tributaries, Security Creek, Rowan Creek, and Browns Creek are of chief concern among study area watersheds; accumulated disturbance closely approaches relatively low TOCs in these areas, reflecting a greater potential for cumulative watershed impacts.

Environmental Effects

Streamflow

Clearcut timber harvesting may influence streamflow through transpiration, interception, snow storage, or snowmelt timing changes. Timber harvest most commonly increases annual streamflow, peak streamflow, and low summer flows (Hicks, Beschta and Harr, 1991). Increased peak flows may erode stream channels, transport high sediment loads, and alter fish habitat, even scouring fish eggs from gravel. Increased summer baseflows may benefit fish by increasing available oxygen and cooling stream temperatures (Hicks, Beschta, and Harr, 1991).

Several Pacific Northwest water yield studies record significant peakflow and summer low flow increases from small watersheds following extensive clearcut harvest (Harr, 1976; Christner and Harr, 1982). Rainy season streamflow increases were more noticeable than summer low flow increases, which diminished rapidly with vegetation regrowth (Harr, 1983).

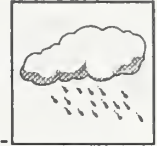
Little study of streamflow within harvested watersheds has taken place in southeast Alaska. Data from the Maybeso watershed on Prince of Wales Island (following twenty-five percent clearcutting of the drainage) revealed no measurable streamflow change (Meehan et al., 1969). Yet, following a thirty-five percent clearcut, the Staney Creek watershed shows significant increases in summer base flows (Bartos, 1989).

A paucity of regional studies makes accurate predictions of streamflow response to timber harvest in the study area impossible. Nevertheless, clearcut size, distribution, and scheduling considerations in all alternatives anticipate minimal streamflow changes.

Water Quality

Best Management Practice (BMP) application is expected to maintain water quality during and after timber harvest and road construction. Hydrologists, Soil Scientists, Fisheries Biologists, Foresters, Engineers and other specialists apply BMPs throughout project planning and administration according to FSH 2509.22. The unit plans and road descriptions in Ap-

pendix A of this document describe BMP application on a site-specific basis; all alternatives apply BMPs equally. BMP implementation and effectiveness is monitored with assistance from the Department of Environmental Conservation through a Memorandum of Agreement. BMP implementation and monitoring assure compliance with the goals of state water quality standards and the Clean Water Act.



Sediment

Increased erosion from road construction, road use and ground disturbance during timber harvest may result in sediment loads that can trigger channel instability and degrade fish habitat. Activities on steep slopes and in riparian areas demand special attention to ensure minimal impacts. The IDT identified concerns and appropriate BMPs using photo interpretation, resource inventories, stream channel process group information, and field verification.

The soils section of this document addresses an increased risk of soil mass movement associated with timber harvest and road construction. Site-specific BMPs applied during unit location and design; and road location, design, and construction minimize the potential for increased soil mass movement and resulting sediment loads.

No-cut buffers (one-hundred-foot minimum width) will protect most Floodplain and Moderate Gradient Process Group streams--usually Class I or II--from timber harvest disturbance. Road location, bridge and culvert design, and construction timing BMPs will minimize sediment introduction from road construction.

Harvest units often contain Alluvial Fan and High Gradient Contained Process Group streams. The inherent channel and sideslope instability of many of these streams requires special protection measures during timber falling, yarding, and road construction. Unit design attempts to use protected streamcourses as splitlines for yarding settings, thus enabling full suspension over many streams. Often, partial suspension provides adequate protection of streams which are not deeply incised. The need for full versus partial suspension is determined on a stream-by-stream basis.

Anticipated sediment load increases, particularly in response to stream crossings, will be minimized through the application of BMPs. A southeast Alaska study of timber harvesting and road construction indicates that sediment increases may not exceed the range of natural variability of study area streams (Paustian, 1989).

While BMPs apply equally to each alternative, each alternative will result in different levels of disturbance. Timber harvest acreage, harvest on high-hazard soils, stream mileage within and bordering clearcuts, road mileage, and streamcrossing numbers are indicators of relative sediment production differences between alternatives. In all cases, Alternative 3 involves the greatest amount of disturbance. Alternative 1 involves the least disturbance. Alternatives 4 and 2 are quite similar; Alternative 4 has a slightly higher potential for sediment production.

Stream Temperature

Anticipated stream temperature effects are negligible. No-cut buffer strips along Class I and II streams will maintain shade.

**Cumulative Watershed Effects**

Table 3-64 displays the equivalent disturbance of each alternative along with each watershed's Threshold of Concern (TOC). Most watersheds remain well below their TOC percentages. However, Kadake Creek (109-42-10300C) and Security Creek (109-45-10100) approach their TOC in Alternatives 2 and 4 (17/20% and 18/20% respectively). Browns Creek (109-52-10080) approaches its TOC in Alternative 3 (18/20%) and reaches its TOC in Alternatives 2 and 4 (20/20%).

While this analysis does not predict actual impacts, it provides an indication that these watersheds have a higher risk of potential sediment production resulting from cumulative watershed impacts. Future ground disturbance in these watersheds requires prudence. These watersheds may be priority areas for BMP effectiveness monitoring projects (see the monitoring plans in Appendix C). Cumulative effects for the reasonably foreseeable future, because of the TOC concept, are expected to remain at or below the TOC for the study area.

Table 3-64

Cumulative Watershed Effects - Threshold of Concern and Watershed Disturbance by Alternative

Name	ADF&G Number	VCU	TOC (%)	Equivalent Watershed Disturbance (%)			
				Alt 1	Alt 2	Alt 3	Alt 4
	105-10-10010	416	50	0	0	0	0
	105-10-10030	416	40	0	0	0	0
	105-31-10090	417	50	1	1	28	28
Failure	105-31-10100	417	60	0	0	13	13
	105-31-10110	417	60	3	3	10	10
Goose	105-31-10115	417	60	1	1	9	9
	105-31-10120	417	60	0	0	11	14
	105-31-10140	417	60	1	1	14	14
	105-31-10150	417	70	0	0	26	26
	105-31-10180	417	50	0	0	16	16
Trouble	105-31-10190	416	50	0	0	11	11
Alvin	105-31-10200	416	30	1	1	18	10
	105-31-10205	416	50	0	0	14	0
	105-31-10207	416	50	0	0	25	25

Table 3-64

Cumulative Watershed Effects - Threshold of Concern and Watershed Disturbance by Alternative

Name	ADF&G Number	VCU	TOC (%)	Equivalent Watershed Disturbance (%)			
				Alt 1	Alt 2	Alt 3	Alt 4
	105-31-10210	416	70	0	0	17	0
	105-31-10221	416	40	0	0	24	0
	105-31-10220	416	50	0	0	24	0
	105-31-10250	416	60	0	0	15	0
	105-31-10260	416	60	0	0	11	0
	105-31-10270	416	50	0	0	9	0
	105-31-10290	416	50	0	0	0	0
	105-31-10295	416	50	0	0	0	0
	105-31-10300	416	60	0	0	0	0
	105-32-10670	419	70	7	11	11	11
Hiller	105-32-10690	419	40	2	12	12	6
	105-32-10700	419	70	11	11	11	11
Kisutch	105-32-10730	419	40	3	3	3	3
Apricot	105-32-10750	419	40	4	4	4	4
Toenail	105-32-10800	418	50	1	1	8	8
Bataan	105-32-10820	418	25	0	0	9	8
	105-32-10840	418	70	0	0	0	0
	105-32-10850	418	50	0	0	14	14
	105-32-10860	418	50	0	0	24	24
Kadake	109-42-10300A	421	20	7	8	7	8
Kadake	109-42-10300B	421	20	12	14	12	14
Kadake	109-42-10300C	421	20	14	17	14	17
	109-42-10400	398	70	12	13	12	13
	109-42-10500	398	50	0	0	0	0
	109-42-10550	398	60	5	5	5	5
	109-43-10018	420	60	0	0	0	0
Slippery	109-43-10030	420	25	0	12	10	0
	109-43-10035	420	60	0	0	0	0
	109-43-10040	420	50	0	18	18	0
	109-43-10050	420	50	14	14	14	14



Table 3-64

Cumulative Watershed Effects - Threshold of Concern and Watershed Disturbance by Alternative

Name	ADF&G Number	VCU	TOC (%)	Equivalent Watershed Disturbance (%)			
				Alt 1	Alt 2	Alt 3	Alt 4
	109-43-10060	420	25	1	1	1	1
	109-43-10080	420	35	0	0	0	0
Rock	109-43-10120	420	60	11	16	12	16
Crane	109-43-10160	420	60	15	16	15	16
	109-44-10020	420	60	3	3	3	3
	109-44-10025	399	70	0	0	0	0
Straight	109-44-10350	399	40	28	28	28	28
Shana	109-44-10370	399	30	9	9	9	9
Saginaw	109-44-10390	399	20	12	12	12	12
	109-45-10090	400	50	33	37	33	37
Security	109-45-10100	400	20	14	18	15	18
Fall Dog	109-45-10130	400	10	0	0	0	0
	109-45-10150	400	30	0	0	0	0
	109-45-10160	400	40	0	0	0	0
	109-45-10170	400	20	0	0	0	0
	109-45-10190	400	50	0	0	0	0
Ledge	109-50-10050	399	60	10	15	15	15
Dean	109-50-10070	400	40	17	18	18	18
	109-51-10050	401	40	0	0	0	0
	109-51-10070	401	40	0	0	0	0
	109-52-10010	402	40	0	3	3	3
	109-52-10020	402	40	0	9	9	9
	109-52-10040	402	40	0	18	18	18
	109-52-10045	402	20	1	3	3	3
	109-52-10050	402	50	2	2	2	2
Rowan	109-52-10060	402	20	10	12	11	12
Browns	109-52-10080	402	20	17	20	18	20
	109-52-10120	402	70	0	0	0	0

Source: Johnejack, 1991

- 2 109-42-10550
- 3 109-42-10500
- 4 109-44-10020
- 5 109-50-10070
- 6 109-50-10050
- 7 109-44-10025
- 8 109-42-10400
- 9 109-45-10190
- 10 109-44-10390
- 11 109-44-10350
- 12 109-45-10090
- 13 109-44-10370
- 14 109-45-10170
- 15 109-42-10300A
- 16 109-45-10160
- 17 109-45-10150
- 18 109-45-10100
- 19 109-51-10050
- 21 109-45-10130
- 23 109-42-10300C
- 24 109-43-10018
- 26 109-51-10070
- 27 109-43-10160
- 28 109-43-10030
- 29 109-52-10010
- 30 109-43-10035
- 31 109-43-10120
- 32 109-52-10050
- 33 109-52-10045
- 34 105-32-10890
- 35 109-52-10020
- 36 109-52-10040
- 37 109-43-10040
- 38 109-43-10080
- 39 109-52-10120
- 40 105-32-10730
- 41 109-43-10060
- 42 105-32-10700
- 43 109-43-10050
- 44 105-32-10670
- 45 105-32-10750
- 46 105-32-10800
- 47 105-32-10820
- 48 105-32-10840
- 49 105-32-10850
- 50 105-32-10880
- 51 105-31-10100
- 52 105-31-10090
- 53 105-31-10110
- 54 105-31-10115
- 55 105-31-10120
- 56 105-31-10140
- 57 105-31-10150
- 58 105-31-10190
- 59 105-31-10180
- 60 105-31-10200
- 61 105-31-10205
- 62 105-31-10210
- 63 105-31-10207
- 64 105-31-10211
- 65 105-31-10260
- 66 105-31-10250
- 67 105-31-10220
- 68 105-31-10270
- 69 105-31-10290
- 70 105-31-10295
- 71 105-31-10300
- 72 105-10-10010
- 73 105-10-10030



Wildlife



Affected Environment

Alaska's fish and wildlife are valuable for aesthetic, economic, recreational, and subsistence purposes. Visitors come from all over the world to view bald eagles, spawning salmon, mountain goats, and other wildlife species in southeast Alaska. Over 300 species of birds, fish, reptiles, amphibians and mammals occur in the Tongass National Forest.

Many of these wildlife species exist within the study area and occupy a diverse range of habitats. All the species that occur in the study area will be affected by the proposed action. Therefore, to identify effects on wildlife, this section displays several analytical techniques to evaluate habitat quality for a diversity of species.

Five unique wildlife habitats were identified in the study area. Habitat refers to the kind of environment a species requires or prefers that provides nutritional, thermal and security requirements. Habitat can be described in physical or biological terms, which often includes elevation, topographic position, aspect, plant association and distance from water. A species may occupy a range of different habitats, or more than one distinctive kind of habitat in different seasons. Habitats identified in previous forest management plans and used in this document include: old-growth, forested, beach fringe, estuarine fringe, and streamside riparian. An acreage estimate of each habitat by VCU is included in the wildlife habitats section (Table 3-65).

Several wildlife species that use those habitats were identified for additional evaluation. These species are termed indicator species due to their importance both to the ecosystem and humans, as well as indicating the habitat requirements of many other species with similar habitat requirements. The species selected include: Sitka black-tailed deer, black bear, pine marten, land otter and bald eagle.

The capability of the study area to support the selected indicator species was analyzed with the help of Geographic Information System (GIS) computer habitat capability models developed for the Tongass Forest Plan Revision effort. These models provide an objective method to evaluate habitat and display the effects of proposed management activities. It is important to note that the habitat suitability indices (HSI) generated by the models do not reflect actual population estimates, but rather potential numbers of the species that the habitat is capable of supporting.

The Habitat Suitability Index generates a range of values from 0 to 1, with 0 having no value for the selected species, .5 reflective of average habitat, and a maximum of 1 indicating optimum habitat. For example a value of .20 would indicate that the area is currently capable of supporting about 20 percent of the population that the best habitat could support. Acreage for each habitat was analyzed in the 1981-86 and 1986-90 FEISs. Since preparation of those

management plans, more specific information has been obtained for the study area. This updated inventory information is reflected in this analysis.

One non-inventoried habitat occurring in the analysis area is alpine/subalpine. Subalpine habitat is the upper edge of forested areas (within 1,000 feet) adjoining alpine areas. This habitat is important summer range for deer and bear. Alpine/subalpine habitat is not included in this analysis because timber is not harvested there, and it would be essentially unaffected by the proposed action.



Wildlife Habitats

Emphasis habitats inventoried since the Tongass Land Management Plan for the study area include beach fringe, estuarine fringe, streamside riparian and old-growth forest blocks. The inventory was predominantly obtained from GIS computer maps. Mylar maps prepared with the help of topographical maps and aerial photos for the Draft Supplement to the Environmental Impact Statements for the 1981-86 and 1986-90 Operating Periods were used for validation. Ground verification was completed in areas where questions of habitat suitability occurred. Revisions to mapped units were completed and are reflected in the unit plans and all maps.

Forested habitat includes all areas with forest cover that has not been identified as an emphasis habitat. All other habitats evaluated in this EIS are located within the forested habitat. Many wildlife species, including those dependent on old-growth, make use of other forested areas within the study area. Therefore, while the other habitats have been delineated because of specific attributes or management concerns, the forested habitat is presented to disclose general overall effects on carrying capacity for a wide diversity of forest dependent species (1986-90 FEIS, pages 3-22 and 3-23).

Table 3-65 lists the estimated amount of wildlife habitat prior to extensive timber harvest (for this analysis 1954). It is important to recognize that when trees are harvested from a habitat, the habitat's potential still exists. However, that habitat is converted to an earlier successional stage. Depending upon the wildlife species of concern, the value of that habitat will increase or decrease. Eventually, hiding cover and thermal cover values of the maturing stand will increase while forage production will decrease. For most species of concern, this will reduce the habitat's value.

Table 3-65 also displays the amount of unaltered wildlife habitats remaining as of December 31, 1991. This includes logging that occurred under the Long-Term Timber Sale Contract and earlier clearcut logging that has occurred primarily since the 1950s, although some harvesting took place as early as 1918. In specific VCUs there has been harvest exceeding 10%, but on the average each habitat type has had 10% or less harvest.

Table 3-65

Acres of Old-Growth Wildlife Habitats Prior to Recorded Timber Harvest and Existing as of 1992

VCU	Beach Fringe		Estuary Fringe		Streamside Riparian and Oversteepened Slopes		Forested	
	1954	1992	1954	1992	1954	1992	1954	1992
398	2,354	2,067	210	210	723	707	9,913	9,025
399	1,794	1,638	441	426	3,507	3,000	19,863	16,502
400	1,145	1,144	2,214	2,205	4,836	4,652	20,589	16,829
401	1,048	1,048	113	113	6,477	6,477	6,287	6,287
402	917	898	1,657	1,608	6,261	5,918	23,637	19,452
405.1	0	0	0	0	187	187	1,533	1,533
416	1,617	1,521	447	396	2,157	2,123	12,015	11,927
416.1	644	644	0	0	0	0	181	181
417	1,507	1,275	0	0	606	604	8,139	7,979
417.1	565	565	0	0	124	124	1,301	1,301
418	549	512	591	591	1,079	1,065	7,454	7,402
419	1,316	1,048	566	546	2,613	2,522	14,836	14,193
420	2,720	2,543	639	631	3,861	3,793	26,066	25,218
421	722	620	227	227	5,094	4,827	28,040	23,471
Total	16,898	15,523	7,105	6,953	37,525	35,999	179,854	162,070

Source: Brainard, 1992

Table 3-66

**Percent of Various Old-Growth Wildlife Habitats
Remaining Through 1991**

VCU	Beach Fringe	Estuary Fringe	Streamside Riparian and Oversteepened Slopes	Forested
398	88	100	98	91
399	91	97	86	83
400	100	100	96	82
401	100	100	100	100
402	98	97	95	82
405.1	100	100	100	100
416	94	89	98	99
416.1	100	100	100	100
417	85	100	100	98
417.1	100	100	100	100
418	93	100	99	99
419	80	96	97	96
420	93	99	98	99
421	86	100	95	85
Total	92	98	96	90

Source: Brainard, 1992

Habitat Descriptions

Beach Fringe

Forested areas within 500 feet of the ocean are transition zones between land and water, salt and freshwater, and vegetated and non-vegetated conditions (TLMP Task Force Paper). Forested areas in this transition zone receive heavy use by species with high economic, recreational, subsistence, or aesthetic values. Black bear, river otter, bald eagle, pine marten, black-tailed deer, Arctic and American peregrine falcons, osprey, numerous duck species, and Vancouver Canada geese are well known species that concentrate their activities during at least some of the year in beach fringe. Many of these species exhibit a preference for or dependence on mature/overmature forest stands.

Table 3-65 indicates approximately 16,900 acres of beach fringe habitat existed in the study area prior to any recorded timber harvest. Of that total, approximately 15,523 acres or 92

percent will remain unaffected by harvest activities scheduled through December 31, 1991 (Table 3-66).

Estuarine Fringe



Bears, waterfowl, furbearers, and eagles are all primary users of the estuarine fringe habitat. Although timber harvest activities have been minimal within the actual estuarine habitat, it is the timbered zone that borders estuarine habitat that is evaluated here. A 1,000-foot timbered zone around estuarine areas was identified in the Tongass Land Management Plan Wildlife Task Force Working Report and was used in the 1986-90 FEIS (page 3-22) to quantify alteration of habitat. The forested estuarine fringe is similar to beach fringe but due to species diversity it has a greater value to wildlife; especially black bears, river otters, peregrine falcons, and waterfowl.

Table 3-65 indicates approximately 7,105 acres of estuarine fringe habitat existed in the analysis area prior to any recorded timber harvest. Of this total, approximately 6,950 acres (or 98%) remains unaffected by harvest activities as of December 1991. No units are planned in estuarine fringe habitat, but road access through it may occur.

Streamside Riparian and Oversteepened Slopes

Riparian habitat (as defined by TTRA and riparian soils) is recognized as some of the most diverse and productive wildlife habitat in the analysis area. It occurs along stream-courses or around lakes and is extremely important for eagles, furbearers, bears, and many other less visible species.

Table 3-65 indicates 37,525 acres of riparian habitat existed in the analysis area prior to any recorded timber harvest. Of that total, approximately 1,650 acres, has been harvested, leaving about 96 percent of the original habitat intact as of December 1991 (Table 3-66) and with the passage of TTRA, no additional harvest will occur within these riparian areas.

Forested

Much of the forest in the study area can be considered old-growth since it has been largely unaffected by timber harvest or fires. This forest type is characterized by stands of trees usually well past the age of maturity, with declining growth rates and signs of decadence, such as dead and dying limbs, snags, and downed woody material. The stand usually includes large diameter trees, multi-layered canopies, a range of tree diameter sizes, and the notable presence of understory vegetation. These forests are in a dynamic, steady-state where the death of old trees is balanced by the growth of new trees.

Old-growth forests have broken, multilayered canopies through which sunlight penetrates to the forest floor. The forest floor is typically carpeted by an abundance of ferns, mosses, herbs, and shrubs. Lichens and fungi add to the diversity, as do standing snags and decaying logs, both on the ground and in streams. Seedlings, saplings, and pole-sized trees grow in the scattered openings that are created as large old trees die and fall to the forest floor. Trees of all ages occur in such stands, and the ages of dominant trees often exceed 300 years.

Table 3-65 indicates that over 179,850 acres of forested habitat existed in the area before timber harvest and that approximately 162,070 or about 90% is currently available (Table 3-66).

Old-Growth Habitat Blocks

For many years forest managers have designed harvest units in staggered settings that result in a regular pattern of similar sized clearcuts with leave strips between the units. When viewed from the traditionally taught concepts of wildlife habitat management this pattern maximized edge habitat to the benefit of many wildlife species. Creation of edge was, and remains a desirable habitat objectives for many species.



Recently, a broader perspective of wildlife ecology has recognized that certain groups of wildlife prefer forest interior habitat not affected by openings or abrupt edges created by timber harvesting. Research has demonstrated that edge effects may extend up to 2 to 3 tree heights into the forest stand (Harris, L.D., 1984).

When viewed at a larger landscape scale this staggered setting harvest technique has fragmented many areas thus minimizing the availability of interior forest habitats. Simulation studies have demonstrated that when as little as 50% of the forest in a watershed has been harvested in this way, little if any forest interior habitat conditions remain. This could have long term negative impacts on old-growth ecosystems and maintenance of plant and animal biodiversity.

To assess the current availability of old-growth forest habitat necessary to provide for biodiversity and insure viable well distributed populations of dependent species, large blocks of mature forest were mapped on Kuiu Island by an interdisciplinary team including representatives from the Alaska Department of Wildlife Conservation in September, 1990. Old-growth blocks were identified for Wildlife Analysis Areas (Alaska Department of Fish and Game, Division of Wildlife Conservation 1969), including portions of the study area. The Wildlife Analysis Area (WAA) boundaries do not match the study area boundaries, so some of the blocks are actually outside of the study area, but they are still important to wildlife in the study area.

The Interagency Committee report "A Strategy for Maintaining Well-Distributed, Viable Populations of Wildlife Associated with Old-Growth Forests in Southeast Alaska" identified habitat conservation Areas (HCAs). This document uses that concept and all of the committee's recommended areas, and three additional old-growth blocks (Conclusion, Cool Lake, and Salt Lagoon) are included.

For purposes of this analysis, these blocks will be useful to evaluate effects of alternative implementation on old-growth ecosystems, their dependant organisms, and potential biodiversity. These blocks are not a land allocation and may or may not be considered in future project planning efforts. Table 3-67 lists the old-growth blocks and their respective acreage. For a map of the old-growth blocks, see Figure 3-10.

It is also useful to consider how management on the rest of the island contributes to old-growth habitat. Both the Tebenkof Wilderness (64,135 acres) and the Kuiu Wilderness (60,567 acres) are adjacent to the study area. Rocky Pass (74,415 acres split between Kuiu and Kupreanof Islands) is a LUD II area adjacent to the east side of the study area. The old-growth habitat within these large areas contributes to the abundance and variety of wildlife on the island. These areas are not available for development activities.

Table 3-67

Old-Growth Habitat Blocks

Block Name	Acres
Conclusion	1,998
Cool Lake	3,546
Kadake	11,433
Kutlaku	12,219
Rocky Pass	14,480
Salt Lagoon	7,560
Security	23,472

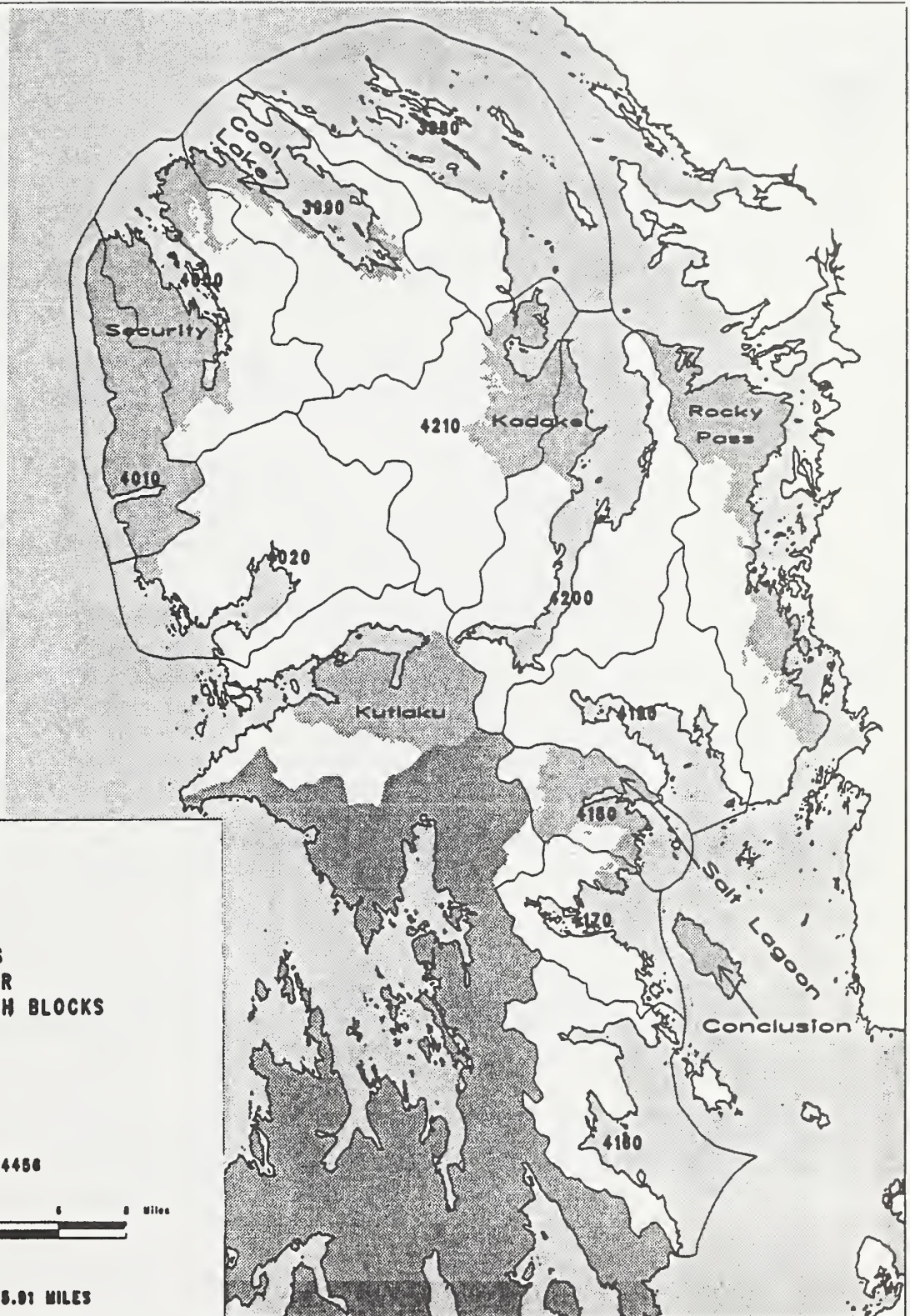
Source: Stikine GIS Database

Reserve Trees (Snags)

Another important habitat component of forest blocks are snags for cavity nesting birds and mammals. Snags are defined as dead trees at least 15 inches in diameter at breast height and 10 feet in height or higher. It is estimated in southeast Alaska that the snag dependant hairy woodpecker requires an average of 672 snags per 100 acres to achieve maximum population densities. The less snag dependant red breasted sapsucker requires approximately 160 per acre for optimum habitat.

Figure 3-16

Old- Growth Habitat Blocks



Legend

- WILDERNESS
- SALT WATER
- OLD GROWTH BLOCKS

MAPSCALE 1:374456



SCALE 1 INCH = 5.91 MILES

Stand data for the analysis area indicates there are currently more than 2,000 snags per 100 acres of forested area (lands supporting at least 10 percent tree cover)(Pawuk, W.H. and Kissinger, E.J., 1989).



On the Tongass National Forest, several Management Indicator Species (MISs) proposed for the Revision of the Tongass Land Management Plan may be sensitive to forest fragmentation and may require minimum patch sizes to achieve 100 percent habitat effectiveness (Table 3-67). In addition, several other species occurring within the Kuiu analysis area have been found in recent research to be sensitive to fragmentation and edge habitat (e.g. sharp-shinned hawk, golden-crowned kinglet, and Townsends warbler), however, this data does not come from research conducted in southeast Alaska.

Table 3-68 displays acreage estimates of minimum old-growth patch size necessary to achieve 100 percent habitat effectiveness for several proposed Management Indicator Species identified as potentially sensitive to forest fragmentation. Estimates are also displayed for two additional species that have recently received attention in southeast Alaska which may be effected (e.g. marbled murrelet and northern goshawk, Analysis of the Management Situation, Tongass National Forest Land and Resource Management Plan Revision-R10-MB-89).

Table 3-68

Estimates of Old-Growth Patch Size (in acres) for Selected Species

Old-Growth Patch Size	Minimum Patch Size for Optimum Habitat
Sitka Black-tailed Deer	1,000
Brown Creeper	15
Hairy Woodpecker	500
Red breasted sapsucker	250
Marten	180
Red Squirrel	30
Goshawk	5,000 to 8,000
Marbled Murrelet	600

Source: Daniels: 1991

Wildlife Species

Management Indicator Species

In addition to identifying wildlife habitats, four mammals and one bird referred to as indicator species were selected for further evaluation. A species can be termed as an indicator species for a variety of reasons. They may be threatened or endangered animals identified on state or federal lists. They may also include species commonly hunted, fished or trapped, or non-game species of special interest. Most importantly they represent a variety of other species with similar habitat requirements since it is impossible to analyze habitat effects for over 300 species. This is consistent with the National Forest Management Act which requires that management indicator species be identified for each national forest and be used for environmental analysis.



Table 3-69

Management Indicator Species

Species	Reason for Selection
Sitka Black-tail Deer	Important sport and game species
Marten	Old-growth indicator; important furbearer
Black bear	Indicator of estuarine habitat; important game species
River Otter	Indicator of riparian habitat, furbearer
Bald Eagle	Indicator of beach fringe habitat; high public interest
Source: Daniels, 1991	

The development of a species model involves an extensive process of biological and literature research by a team of recognized experts. Team members are selected from a variety of sources including the Alaska Department of Fish and Game, Forest Service, US Fish and Wildlife Service, and other land management agencies. After a draft model is prepared, it is thoroughly reviewed by fish and wildlife agency biologists. The model review and verification process allows a consensus among the various interests and lends credibility for its use as a management tool.

As a result of this review and verification the marten densities generated by the original model has been reduced by 32% based on the first year data from a joint Forest Service and ADF&G marten study on Chichagof Island. (Descriptions of the marten model and other models used for this analysis are available in the planning records.)

It is important to note that these models are used as a tool for management decisions. They should be recognized as only one of several sources in the analysis process to identify specific project effects. Knowledge concerning each species and their various habitat needs improves with field validation over time and adds to the reliability of model predictions.



The Role And Reliability Of HSI Estimates

Wildlife professionals and forest planners are increasingly called upon to assess the effects of forest management on wildlife. The National Environmental Policy Act of 1969 (NEPA), the Endangered Species Act of 1973, the National Forest Management Act (NFMA) of 1976, and the increasing public concern about wildlife populations have created a pressing need for land managers to know more about the status of wildlife habitats and how they are affected by human activities.

It is assumed that there is a critical link between a species welfare and the quality of its habitat. Habitat quality is often influenced by timber harvest, road construction, fire, forest succession, and other factors. Habitat models are needed to systematically link important habitat features with quantifiable forest attributes. However, HSIs fill a pressing management need to incorporate habitat analyses into forest planning. In many cases, pressing land management decisions are made with the "best available information", including partially tested HSIs.

It is important to disclose the role of the HSI model and the reliability of its outputs. The following are just some of the factors that need to be considered when reviewing HSI estimates:

- 1) Habitat models estimate habitat quality and do not predict actual populations. Populations are frequently above or below habitat model predictions.
- 2) The geographic extent, quality, and quantity of field studies often contributes to the uncertainty of HSI estimates. In most cases field study findings are extrapolated from elsewhere where prey densities and compositions, predation pressure, plant communities, and climate differ. Secondly, most field studies do not persist long enough to capture annual variation in habitat preference due to changing environmental conditions (e.g. high snowfall).
- 3) Much of the field work done in SE Alaska compares animal use of a habitat to its availability within the study area. Use/availability data does not establish a cause-and-effect relationship between habitat features and carrying capacity (Hobbs and Hanley, 1990; VanHorne, 1986). For example, if we removed the snags from a stand would the marten population go to zero? Conversely if we doubled the number of snags, would the marten population double? An understanding of the cause and effect relationship linking the performance of animal populations to resources in their habitat is fundamentally important to evaluating habitat.
- 4) Technical considerations confound attempts to model wildlife-habitat relationships, these include: (1) nonlinear and nonmonotonic relationships; (2) incomplete sampling along habitat gradients; (3) variability in species' responses to habitat variables; (4) coarseness in measuring habitat variables; and (5) sampling scale. In addition, researchers frequently ignore how the scale of the inventory effects the mapped landscape pattern. For research findings to be relevant to habitat models, research findings need to be linked to forest inventories.

5) When reviewing the field studies used for the formulation and/or validation of an HSI it is difficult to determine the status of a population relative to carrying capacity. This is because (1) it is logistically difficult and expensive to determine wildlife populations and (2) carrying capacity is difficult to estimate for it is a theoretical abstraction rather than a management tool for many animal populations. This may be an important limitation if animal distributions are influenced by density.



Use Of The Model For Alternative Comparison

The wildlife models, by their nature, are best suited for comparison of proposed land management activities. Prediction of animal population numbers at some future date cannot be accomplished with any reasonable precision. Due to their nature, wildlife models cannot precisely predict population numbers. They are best suited for comparison of alternative habitat management proposals.

Model outputs should be viewed as an index of risk used to rank planning alternatives. The statement "the model predicts a habitat capability of 324 animals at 2054 in alternative #1" is misleading. This implies that the model has demonstrated the ability to predict habitat capability in terms of animals numbers. Conversely, the statement "of the 5 alternatives, alternative #1 has the highest habitat capability score at 2054" is more useful. This correctly implies that habitat features that have been associated with marten use will be more abundant in alternative one. It is important to remember that the link between habitat capability and actual population has not been experimentally determined.

The Relationship Between Habitat Capability And Future Populations

We have not determined how habitat scores effect the fundamental parameters governing animal populations. We have assumed that a reduction in HSI scores is directly related to a reduction in carrying capacity. To understand the effect of habitat changes on populations, HSI scores need to be linked to mortality, natality, habitat patch size, emigration and immigration estimates. Furthermore, to predict a future population, information on the population's current density and age and sex composition is also required.

In short, biologists are unable predict wildlife populations into the future, except in the most general of terms.

Indicator Species Descriptions

Sitka Black-Tailed Deer

The Sitka black-tailed deer of southeast Alaska are more abundant on coastal islands than on the mainland (Wallmo and Schoen, 1980). The Sitka black-tailed deer ranges through all major habitats in southeast Alaska. They rely heavily on forested habitats for cover, and much of their feeding is in forested areas. In summer, these deer range through all elevations, but seem to prefer higher elevations including alpine meadows and subalpine forests. They also feed in clearcuts where forage is plentiful. Winter snows drive them to lower elevations, and deep snow forces them to the beach fringe (1986-90 FEIS, page 3-21). They are valued

for recreational and subsistence hunting in southeast Alaska, however, no hunting has been permitted on Kuiu Island since 1975.



The value of habitat for deer, under varying weather conditions, is directly related to the composition, structure, and productivity of vegetation on a site (Harestad, 1985). During low snow conditions, when habitat selection by deer is not significantly influenced by snow, deer will select those habitats that provide the best foraging opportunities. Under intermediate and deep snow conditions, deer will select those habitats that provide for snow interception and food availability. The combination of a dense canopy with scattered openings in old-growth forests allows forage growth under openings while the canopy modifies snowfall sufficiently to promote forage availability and movement of deer.

A HSI model was used to estimate the number of wintering black-tailed deer that could be sustained in the analysis area based on the projected deer habitat capability (Table 3-70) (Suring et al, 1992). The estimated deer numbers in this table include information on carrying capacity before extensive timber harvesting and the present condition to 1991. These are not estimates of actual deer numbers, but rather estimates of the number of animals the habitat could support. Other factors, most notably predation by bears and wolves may keep actual populations below the number the habitat is capable of supporting. The table shows that the analysis area on Kuiu Island could historically support approximately 10,150 deer. Estimates to 1991 indicate that the same area could support approximately 8,790 deer, which represents a 13 percent reduction since timber harvesting began. Field observations suggest that the actual population is somewhat less.

Table 3-70

Habitat Capability - Present Condition by VCU

VCU	Deer	Marten	Black Bear	Otter	Eagle
398	571	45	24	23	47
399	1,163	87	50	26	54
400	976	79	55	32	68
401	346	34	25	13	30
402	1,111	90	60	31	64
405.1	86	6	3	1	1
416	699	66	31	23	45
416.1	42	4	2	6	12
417	429	40	19	15	27
417.1	98	10	4	5	11
418	319	31	17	12	27
419	646	59	33	18	32
420	1,080	104	56	37	75
421	1,225	103	61	24	50
Total	8,781	758	440	266	543

Source: Brainard, 1992; Suring et al, 1992

Marten

Marten are members of the weasel family that are dependent on overmature forests, including beach fringe and streamside riparian. Marten prefer mature conifer or mixed forest stands, although there are indications that they may be adaptable to a variety of forest habitats (Soutiere, 1979). Use of habitat by marten is related to occurrence and availability of foods and cover characteristics. Extensive overmature forests have been called the mainstay of marten populations in the Pacific states because they provide many den sites and an abundant prey base (Suring et al., 1988 and Meslow et al., 1981). Marten are considered a native population on Kuiu Island, according to Rod Flynn, ADF&G.

Snags provide important den sites to martens for resting activities in both winter and summer (Spencer, 1987). They utilize the tops of broken snags as resting sites in the summer and the cavities in winter and summer. Preferred snags have been reported to range from 14 to 49 inches diameter at breast height (dbh) (Campbell, 1979, Simon, 1980, and Spencer, 1987).



Johnson (1981) summarized population densities from several sources and reported a range of 0.6 to 1.9 martens per square kilometer (1.6 to 4.9 per square mile). Martens are trapped for their furs, and would be vulnerable to habitat loss and increased access. On Kuiu Island, access is not a great concern because there is no ferry service for outside vehicles. Individual access will remain similar to the current conditions; i.e., from the beach by boat.

The estimated marten habitat capability in terms of potential marten numbers in Table 3-70 includes information on carrying capacity before logging (1954) and the current condition (1991). The tables show that Analysis Area 12 on Kuiu Island could potentially support approximately 850 marten before 1954. Estimates to 1991 indicate that same area could carry approximately 760 marten, which represents a 11 percent reduction since 1954.

Black Bear

Black bear are distributed over 75 percent of Alaska (Erickson, 1965). They utilize forested habitats for cover and do not stray far into open areas to obtain food. Little is known about black bear populations in southeast Alaska, although densities occurring on Prince of Wales Island are believed to be the highest in Alaska (Erickson, 1965). Portions of Kuiu Island have population densities similar to those found on Prince of Wales Island.

The black bear is omnivorous. In early spring, grasses and forbs dominate the diet, and shrubs are added as foliage becomes available. A wide variety of fruit-producing plants are used during the summer. Berries and fleshy fruits constitute the early fall diet, with grasses increasing in importance as other foods become less available. For many black bear populations, animal predation supplements the diet and consists of insects and carrion. Black bears also feed on fish during summer and fall salmon runs (e.g., on Prince of Wales Island, Meehan, 1974). Bears also frequent open garbage dumps that occur in association with logging camps and other human habitation. This occurred at Rowan Bay Logging Camp on Kuiu before the elimination of open dumping.

Breaking up continuous forested habitat by clearcutting has the potential to increase bear populations by creating foraging areas with abundant preferred foods (Erickson, 1965 and Meehan, 1974). The increased food supply on any given clearcut is short-lived, however. Canopy closure at age 15 to 25 years severely reduces available food supplies. Bear population increases brought about by logging may be expected to decline as second-growth stands enter the phase of minimal forage production (Meehan, 1974).

Kuiu Island is a prized area for black bear hunting and supports a number of outfitters who guide nonresidents primarily during the spring hunt. Since 1985, the harvest of black bears on Kuiu Island has fluctuated from a low of 68 to a high of 107 animals. Sixty-four percent of these animals have been harvested by nonresident hunters. According to Charlie Land, ADF&G Wildlife Biologist, the average age class, skull measurement, and sex ratio of harvested bears have remained constant, indicating that this harvest is having no adverse affect on the populations.

Estimates to 1991 indicate that Analysis Area 12 shows a 1 percent reduction in black bear habitat capability since implementation of the long-term contract.

River Otter

River otters generally occur close to the beach (Larson, 1983 and Woolington, 1984) in the areas recognized as beach fringe habitat. Some also occur along streams and lakes. Otters appear to be relatively intolerant of man, but they are opportunistic and will use man-made structures and log jams, as well as natural cavities and beaver lodges, for dens and resting sites.



Habitat selection is also a product of food availability. Food items include fish, abalone, sea urchins, chitons, crabs, and other marine invertebrates; however, fish are generally the main food source. Otters den and rest in root systems of trees, under logs and rocks, and in other protected sites. Radiotelemetry data show extensive movements along the coastline, usually within 30 meters (98 feet) of saltwater (Woolington, 1984). Otter sightings in freshwater habitats are common.

Typically, land otters are harvested in the winter by trapping. Access to the trapping areas is difficult because of winter conditions and the lack of roads. The trappers will generally get to a shoreline area by boat and then hike to their trap lines. River otters are valuable furbearers, and the populations would be affected by increased access by trappers.

The modeling indicates a 7 percent reduction in otter habitat capability due to timber harvest which are areas mostly used for natal purposes (Woolington, 1984).

Bald Eagle

The population of bald eagles is widely dispersed throughout southeast Alaska during the breeding season. Bald eagles that breed along the coast tend to remain close to their breeding territory throughout the year if food is available. When not involved in nesting activities, however, these birds may temporarily move to feed at abundant sources of food. Habitats commonly used include beach fringe, some estuarine fringe, and streamside riparian. Bald eagles may also concentrate at feeding grounds in the spring. Throughout their range, bald eagles are opportunistic in their use of available food resources. Fish is the dietary mainstay in southeast Alaska (Kalmbach et al., 1964). The study identified fish as 65.7 percent of the year-round diet, although a variety of other foods were taken. These included birds (18.8 percent), mammals (1.2 percent), invertebrates (2.0 percent), and carrion (12.3 percent).

The bald eagle population increases resulted primarily from the protection of the eagles by repeal of bounties, the banning of DDT use, and the nest protection by providing a 330-foot buffer strip around identified nesting sites. Population estimates based on transects flown by the Fish and Wildlife Service show an increase in number from about 7,000 birds in the early 1970s to over 12,000 in 1987 (USFS, 1988). During the same period, the number of bald eagle nests has also exhibited a marked increase. It is important to recognize that bald eagles that nest within the Alaska region comprise over half of the bald eagle population of the entire 50 states and about one-third of the continental population.

The bald eagle model evaluates nesting habitat based on location, elevation, stream class, lake size and vegetation. The model indicates there is suitable habitat to support 543 eagles

(Table 3-70). This is an eight percent decline since 1954. The U.S. Fish and Wildlife Service has identified 48 nest sites in the Kuiu Analysis Area. This reflects an inventoried nest density of 0.53 nests per mile of shoreline, or about 1 nest per 2 miles.



Other Species of Concern

Vancouver Canada Goose

Vancouver Canada geese are unique among all subspecies of Canada geese in that they use forested habitat for nesting and brood rearing (Lebeda and Ratti, 1983). Lebeda (1980) reported that Vancouver Canada geese made use of both noncommercial forest land and low-volume commercial forest land. They nest in wetlands that are found within these forest types (the presence of wetlands correlates with sparse forest cover in such areas). Feeding in wetland edges that may extend into surrounding forest occurs until the young can fly. Then ranging farther away to feed, they eventually reach lush estuarine areas from where they may begin their fall migration south.

The Vancouver Canada Goose utilizes volume class strata 3 and 4 timber usually within 500 feet of lakes, riparian areas, and the beach fringe on wetlands. Harvest activities have been excluded within 500 feet of beach fringe and 1,000 feet of estuarian fringe areas. On lakes with suitable habitat and lakes known to have fledging areas, no harvest is planned within 125 meters (410 feet) of goose habitat.

The Inland Wetland habitat is used in this analysis to evaluate the interior habitat of Vancouver Canada geese and other waterfowl.

The inland lakes and adjacent habitat west of the Salt Lagoon on east Kuiu are heavily used by Vancouver Canada Geese, particularly during molting season in mid-summer.

Gray Wolf

The subspecies of gray wolf known as the Alexander Archipelago wolf (Stephenson, 1989) is found on Kuiu Island. Habitat suitability and capability for wolves are directly linked to populations of their principal prey species. The total population is estimated at fewer than 1000 individuals in all of southeast Alaska (Kirchoff, 1991).

Although wolves are listed as threatened in the contiguous 48 states they are not in Alaska. Kirchhoff (1991) identified four factors which could place this subspecies at risk: 1-liberal trapping and hunting regulations, 2-high road densities, 3-reduced prey populations in areas subject to intensive logging, and 4-inbreeding depression within insular populations.

A joint research proposal between the U.S. Forest Service, the Alaskan Department of Fish and Game, and the University of Alaska is currently under consideration. One of the three objectives in the proposed research is to determine how logging-induced habitat loss and fragmentation influences wolf population size, predation rates on deer, dispersal, and mortality.

Threatened or Endangered Species

Consultation with the US Fish and Wildlife Service and National Marine Fisheries Service during preparation of this document identified no inventoried resident threatened or endangered species in the project area. The American peregrine falcon (*Falco peregrinus anatum*) and the Artic peregrine falcon (*Falco peregrinus tundrius*) pass through the Forest during spring and fall migration flights. The humpback whale (*Megaptera novaeangliae*) inhabits nearby waters, but there is no designated critical habitat near areas of existing or planned log transfer facilities.



Northern (Stellar) sea lions were listed as a threatened species by the National Marine Fisheries Service in June of 1990. There is no important sea lion habitat within the area proposed for management activities.

Sensitive Species

The following eight species have been classified as sensitive on the Tongass National Forest: Peals peregrine falcon, osprey, trumpeter swans, dusky Canada geese, Montague Island vole, Fish Creek chum salmon, King River king salmon, and Wheeler Creek king salmon. There are no known sensitive species currently occurring within the analysis area.

Special Emphasis Species

The northern Goshawk and marbled murrelet are species that are not currently listed in Alaska as threatened, endangered, or sensitive but because of lack of knowledge on there basic ecological requirements, management implications are not well understood. Both require old-growth forests for at least portions of there habitats.

The murrelet has been listed as a threatened species in the continental United States. Baseline ecological data is currently being gathered for this species by state and federal agencies in Alaska.

There are no nest records of marbled murrelets on Kuiu Island. However, marbled murrelets have been detected inland while conducting early morning songbird point counts along the Kuiu Island road system suggesting the possibility of inland nesting by murrelets. In an effort to obtain baseline data on the marbled murrelet distribution on near-shore waters, at-sea surveys were conducted throughout the Stikine Area in July/August 1991. One of the several routes was located in and adjacent to Rowan Bay. This route included both bay waters and coastal exposed waters in Chatham Sound. The highest densities of marbled murrelets of all areas surveyed were detected on the Rowan Bay route. Rowan Bay is also the site of perhaps some of the most intensive timber activity on the Stikine Area.



Table 3-71

Densities of Marbled Murrelets Detected Throughout the Stikine Area in 1991

Date	Transect	Km Covered	Total Murrelets	Murrelets Density ¹
Petersburg Ranger District				
August 1	Rowan Bay	36	1310	29.11
August 7	Cape Strait - Big Creek	46	142	2.47
August 13	Douglas Bay - Totem Bay	38	5	0.11
Wrangell Ranger District				
July 31	Vank - Sokolofs Island	28	1	0.03
July 31	North Etolin	30	3	0.08
August 6	Anita Bay	26	3	0.09

Source: Iverson, 1992

¹ Density = number of murrelets/km of transect surveyed

When an active goshawk nest is located, the "Interim Habitat Management Recommendations for the Northern Goshawk, Tongass National Forest 1992" will be implemented (see Appendix I). The goshawk was proposed as a management indicator species for old-growth forests but was not selected due to lack of basic information on habitat requirements in southeast Alaska. Information on the status and distribution of the Queen Charlotte Goshawk in southeastern Alaska is limited. However, based upon an analysis of all available goshawk nesting records and sitings, a concern has recently evolved concerning the status of this species on the Tongass National Forest. A total of only five confirmed goshawk nests have been located, three are in currently planned harvest units and another was located in an advanced age second growth stand. Another 11 highly probable goshawk observations have been recorded that suggests possible nesting; four of these have been affected/alerted by timber harvest activity. This information suggests that goshawks are uncommon in this region based upon the few sitings and there is an apparent association between timber harvest activity and goshawk nesting habitat. The northern extent of the Queen Charlotte Goshawk range is the Taku River in southeast Alaska (Webster, 1988). Eighty-one percent of the confirmed and probable nest sites in southeast Alaska are south of Frederick Sound (Queen Charlotte Goshawk Statue Report for R10 Sensitive Species Consideration, USDA Forest Service, 1991). This species has been recommended and is currently under review for addition to the Regional Forester's Sensitive Species List.

There are historical occurrences of spotted frogs on the outer islands of southeast Alaska (Brad Norman, USFS, personal communication), with reported occurrence on the islands of Mitkof, Vank, the islands at the mouth of the Stikine River, and possible occurrence on Ku-

preanof and Kuiu. The Forest Service is currently conducting amphibian surveys on the Stikine Area. Portions of Kuiu Island have been surveyed, but no spotted frogs have been located. Surveys are scheduled to continue and surveys on Kuiu Island are scheduled for the 1993 field season. If frogs are located, their locations will be documented and a management decision will be made for the correct course of action. The processes outlined by the Endangered Species Act of 1973 will be adhered to if and when the spotted frog is listed by the US Fish and Wildlife Service for protection.



The harlequine duck may be present in the analysis area. However, TTRA buffers along with beach fringe and estuary fringe buffers should adequately provide for harlequin habitat protection. The procedures outlined by the Endangered Species Act of 1973 will be adhered to if and when the harlequine duck is listed for protection.

Environmental Effects

The information and data included in the previous section, provides the basis for evaluating effects of the proposed alternatives. The analysis and supporting tables provided below considers the alternatives along with general and site-specific differences and similarities among them. Effects are projected not only for the duration of this project, but also for the anticipated duration of the proposed action and the end of the long term timber sale contract (2011).

The environmental consequences for the various habitats and MIS are displayed in relation to the estimated amount of habitat capability which existed on the analysis area in 1954. The 1954 habitat capabilities were derived by recreating old-growth forest conditions for all harvested second growth timber stands identified in the area's "managed stands layer" as having been cut from 1954 to the present.

Direct Effects on Wildlife Habitat

All of the proposed alternatives except for Alternative 1, the no action alternative, include harvesting and roading of wildlife habitat. Many of the proposed harvest units are common to two or all three of the action alternatives. The spacial location of impacts shift throughout the analysis area as harvest units are added or subtracted by alternative.

Project unit design criteria, Best Management Practices, and legislated protective measures (Tongass Timber Reform Act) significantly reduces potential impacts to wildlife habitat, particularly to beach fringe, estuary fringe, and streamside riparian habitats.

Changes in the amount of key habitat types projected by alternative are displayed in Tables 3-72 through 3-74. In some cases habitat types will overlap. An acre of estuary fringe may also be beach fringe and forested habitat. Rather than double count some acres, a hierarchy was developed so any given acre would be assigned the most valuable habitat type. Since estuary was considered the richest habitat, an acre that is both estuary fringe and beach

fringe is only counted as estuary fringe. An acre would be counted as forested habitat if it did not fall into one of the other specific habitat types.

Beach Fringe

The acres of beach fringe habitat impacted by harvest or roading varies from 0 acres in Alternative 2 to 8 acres in Alternative 4. The eight acres impacted in Alternatives 3 and 4 are the result of construction of a log transfer facility at No Name Bay.



Table 3-72

Acres of Beach Fringe Habitat in Productive Old-Growth by Alternative

VCU	Alternative 1	Alternative 2		Alternative 3		Alternative 4	
	Existing Condition	Harvested	After Harvest	Harvested	After Harvest	Harvested	After Harvest
398	2,067	0	2,067	0	2,067	0	2,067
399	1,638	0	1,638	0	1,638	0	1,638
400	1,144	0	1,144	0	1,144	0	1,144
401	1,048	0	1,048	0	1,048	0	1,048
402	898	0	898	0	898	0	898
405.1	0	0	0	0	0	0	0
416	1,521	0	1,521	0	1,521	0	1,521
416.1	644	0	644	0	644	0	644
417	1,275	0	1,275	8	1,267	8	1,267
417.1	565	0	565	0	565	0	565
418	512	0	512	0	512	0	512
419	1,048	0	1,048	0	1,048	0	1,048
420	2,543	0	2,543	0	2,543	0	2,543
421	620	0	620	0	620	0	620
Total	15,523	0	15,523	8	15,515	8	15,515

Source: Brainard, 1992

Estuary Fringe

Roading of estuary fringe habitat will occur only in Alternative 3. This road right-of-way construction would remove 9 acres which is less than one percent of the total acreage available.

Table 3-73

Acres of Estuary Fringe Habitat in Productive Old-Growth by Alternative

VCU		Alternative 2		Alternative 3		Alternative 4	
	After Harvest	Harvested	After Harvest	Harvested	After Harvest	Harvested	After Harvest
398	210	0	210	0	210	0	210
399	426	0	426	0	426	0	426
400	2,205	0	2,205	0	2,205	0	2,205
401	113	0	113	0	113	0	113
402	1,608	0	1,608	0	1,608	0	1,608
405.1	0	0	0	0	0	0	0
416	396	0	396	9	387	0	396
416.1	0	0	0	0	0	0	0
417	0	0	0	0	0	0	0
417.1	0	0	0	0	0	0	0
418	591	0	591	0	591	0	591
419	546	0	546	0	546	0	546
420	631	0	631	0	631	0	631
421	227	0	227	0	227	0	227
Total	6,953	0	6,953	9	6,944	0	6,953

Source: Brainard, 1992; Suring et al, 1992

Streamside Riparian and Oversteepened Slope Habitat

Substantially less than one percent of the streamside riparian habitat will be harvested in any alternative. This harvest will occur on Class II streams that flow directly into salt water and along Class III stream channels within units. These streams are not covered under TTRA for protection, but they will receive protection under the BMPs. No oversteepened slopes will be harvested. Table 3-74 displays the amount of proposed harvest by alternative.

Table 3-74

Acres of Streamside Riparian and Oversteepened Slope Habitat in Productive old-Growth by Alternative

VCU		Alternative 2		Alternative 3		Alternative 4	
398	707	0	707	0	707	0	707
399	3,000	3	2,997	0	3,000	3	2,997
400	4,652	11	4,641	3	4,649	11	4,641
401	6,477	0	6,477	0	6,477	0	6,477
402	5,918	47	5,871	41	5,877	47	5,871
405.1	187	0	187	0	187	0	187
416	2,123	0	2,123	67	2,056	9	2,114
416.1	0	0	0	0	0	0	0
417	604	0	604	15	589	15	589
417.1	0	0	0	0	0	0	0
418	1,065	0	1,065	33	1,032	33	1,032
419	2,522	15	2,507	15	2,507	12	2,510
420	3,793	30	3,763	27	3,766	1	3,792
421	4,827	4	4,823	0	4,827	4	4,823
Total	35,875	110	35,765	201	35,674	135	35,740

Source: Brainard, 1992; Suring et al, 1992

Forested

Forested habitats include all areas with forest cover. The majority of this habitat is comprised of old-growth timber. Under all proposed alternatives, less than three percent of the total forested habitat would be harvested. Alternative 3 would harvest the most.

Table 3-75

Acres of Forested Old-Growth Habitat by Alternative

VCU		Alternative 2		Alternative 3		Alternative 4	
	After Harvest	Harvested	After Harvest	Harvested	After Harvest	Harvested	After Harvest
398	9,025	21	9,004	0	9,025	21	9,004
399	16,502	708 ¹	15,794	24 ¹	16,478	709 ¹	15,793
400	16,829	519	16,310	219	16,610	519	16,310
401	6,287	0	6,287	0	6,287	0	6,287
402	19,452	756	18,696	398	19,054	756	18,696
405.1	1,533	0	1,533	1,533	1,533	0	1,533
416	11,927	0	11,927	1,161 ¹	10,766	411 ¹	11,516
416.1	181	0	181	0	181	0	181
417	7,979	0	7,979	1,101	6,878	1,120	6,859
417.1	1,301	0	1,301	0	1,301	0	1,301
418	7,402	0	7,402	709	6,693	680	6,722
419	14,193	514	13,679	514	13,679	256	13,937
420	25,718	1,701	24,017	1,191	24,527	232	25,486
421	23,741	668	23,073	33	23,708	668	23,073
Total	162,194	4,887	157,183	5,350	156,720	5,372	156,698

¹ Acres include entire partial cut unit area

Source: Brainard, 1992; Suring et al, 1992

Direct Effects on Habitat Capability

This section displays how the changes in habitats discussed in the previous section effect the potential habitat capability for each MIS. It must be emphasized that these populations displayed are not estimates of current MIS populations within the analysis area, but estimates of the various habitat's abilities to support these potential populations. Actual populations of the MIS are not known at this time and are subject to change due to predation, weather, and other factors. Alternative 1, the no-action alternative, would have no direct effect for any MIS.



Table 3-76

Habitat Capability - Alternative 2 by VCU

VCU	Deer	Marten	Black Bear	Otter	Eagle
398	569	45	24	23	47
399	1,163	87	50	26	54
400	951	77	54	32	68
401	346	34	25	13	30
402	1,072	87	59	31	63
405.1	86	6	3	1	1
416	699	66	31	23	45
416.1	42	4	2	6	12
417	429	40	19	15	27
417.1	98	10	4	5	11
418	319	31	17	12	27
419	626	57	33	18	32
420	1,014	97	55	37	74
421	1,225	100	61	24	50
Total	8,639	741	437	266	541

Source: Brainard, 1992

Table 3-77

Habitat Capability for Deer by WAA

WAA	Alternative 1	Alternative 2	Alternative 3	Alternative 4
5012	5,392	5,326	5,449	5,353
5013	2,197	2,131	2,887	2,187
5014	1,663	1,663	1,545	1,572
5018	1,558	1,538	1,538	1,111
Total	10,810	10,658	11,419	10,223

Source: Brainard, 1992

Table 3-78					
Habitat Capability - Alternative 3 by VCU					
VCU	Deer	Marten	Black Bear	Otter	Eagle
398	570	45	24	27	47
399	1,210	90	50	26	54
400	977	79	55	32	68
401	346	34	25	13	30
402	1,093	88	60	31	63
405.1	86	6	3	1	1
416	653	61	31	23	44
416.1	42	4	2	6	12
417	383	35	19	15	27
417.1	98	10	4	5	11
418	294	28	17	12	26
419	626	57	33	18	32
420	1,036	100	55	37	74
421	1,253	102	61	24	50
Total	8,667	739	439	266	539
Source: Brainard, 1992					



Table 3-79

Habitat Capability - Alternative 4 by VCU

VCU	Deer	Marten	Black Bear	Otter	Eagle
398	570	45	24	23	47
399	1,163	87	50	26	54
400	977	79	55	32	68
401	346	34	25	13	30
402	1,072	87	59	31	63
405.1	86	6	3	1	1
416	681	64	31	23	45
416.1	42	4	2	6	12
417	381	35	19	15	27
417.1	98	10	4	5	11
418	295	28	17	12	26
419	633	58	33	18	32
420	1,070	103	56	37	75
421	1,225	100	61	24	50
Total	8,639	740	439	266	541

Source: Brainard, 1992

Sitka Black-Tailed Deer

Tables 3-76 through 3-79 display estimated changes in Sitka black-tailed deer winter habitat capability for each proposed alternative by VCU. In making these estimates, the "Habitat Capability Model for Sitka Black-Tailed Deer in southeast Alaska: Winter Habitat" (Suring et al. 1992), was used. Alternatives 2 and 4 would decrease deer habitat capability by 2 percent. Alternative 3 would decrease habitat capability by 1 percent.

Marten

Tables 3-76 through 3-79 display estimated changes in marten winter habitat capability for each of the three action alternatives. In making these estimates, the "Habitat Capability Model for Marten in Southeast Alaska: Winter Habitat" (Suring et al. 1988 with 1991 revisions), was used. On the entire analysis area, the estimated winter habitat capability for marten in 1954 was 849 animals. Implementation of Alternatives 2 and 4 would result in a reduction of 2 percent of the unharvested potential and Alternative 3 would result in a reduction of 3 percent.

Black Bear

As described by Suring, et al (1988), there is an estimated relationship between the amount of timber harvesting in old-growth forests and potential populations of black bear. From a base habitat capability of 446 bear in 1954, the current population potential of 440 is reduced 1 percent or less under any alternative.



River Otter

As described by Suring, et al, (1988), there is a relationship between the amount of timber harvested within beach fringe and riparian areas and reductions in spring/early summer otter habitat capability. Otter is a species that has benefited from alternative design that has virtually removed beach fringe, estuary fringe, and stream corridors (TTRA) from harvest. None of the action alternatives will cause a decrease in otter habitat capability.

Bald Eagle

By planning harvest activities away from beach and estuary fringe, and Class I and II streams, potential impacts to eagle habitat have been reduced to one percent or less in all action alternatives.

All alternatives implement the Interagency Agreement between the U.S. Forest Service and the U.S. Fish and Wildlife Service for the management of bald eagles in southeast Alaska, i.e., a 330-foot no harvest buffer around inventoried nests and timing restrictions for road construction and other activities near active nests with eggs or unfledged young.

Should an encroachment within this nest buffer appear unavoidable, the Forest Service will request a variance in writing from the U.S. Fish & Wildlife Service. A joint analysis will be conducted, if deemed necessary, including alternatives. Any habitat management recommendations developed and agreed to during the on-site analysis will be included as part of a variance to the terms of the Interagency Agreement.

Effects on Old-Growth Habitat (Biodiversity)

The old-growth blocks of Conclusion, Kutlaku, Rocky Pass, and Security Bay will not be affected by any alternative.

The old-growth block near Kadake will have acres harvested in two of the action alternatives. Alternatives 2 and 4 will each harvest 1.14 percent of the total acreage of this old-growth block. No fragmentation of the habitat will occur by these actions. This document proposes a larger area for this old-growth block than was identified by the interagency committee. The proposed harvest is not within the committee's HCA.

The Salt Lagoon old-growth block will not be impacted by Alternative 2. Alternatives 3 and 4 will each harvest less than 8 percent of the area. This may cause some fragmentation of this block. Units are designed to minimize fragmentation by providing a travel corridor



from the Tebenkof Wilderness to the Salt Lagoon. The Salt Lagoon block was not included in the recommendations of the interagency committee.

Some harvest would occur within the Cool Lake old-growth block in Alternatives 2 and 4. The majority of the proposed harvest would be group selection with helicopter yarding (unit 399-19) and is designed to have very little impact on the structure or function of the old-growth ecosystem.

The acres remaining in each old-growth block are displayed below.

Table 3-80

Old-Growth Block Acres

Old-Growth Block	Alternative			
	1	2	3	4
Conclusion	1,998	1,998	1,998	1,998
Cool Lake	3,546	3,341	3,546	3,341
Kadake	11,433	11,302	11,433	11,302
Kutlaku	12,219	12,219	12,219	12,219
Rocky Pass	14,480	14,480	14,480	14,480
Salt Lagoon	7,560	7,560	6,958	6,966
Security	23,472	23,472	23,472	23,472

Source: Brainard, 1992

In addition to these blocks, all of the wildlife habitat in the adjacent Tebenkof and Kuiu Wilderness Areas and Rocky Pass LUD II area will remain in a natural condition.

Other Species of Interest

Marbled Murrelet

Marbled murrelets are known to occur in the waters around the analysis area. No known nests have been located. If a nest site is located it is recommended that a 30-acre radius buffer surrounding the nest be provided. Roads can enter this buffer if unavoidable, but every effort should be made to protect the nest site.

Goshawk

Goshawks are found in the Stikine Area. No known nests have been recorded in or around the analysis area. If a subsequent nest site is located, the "Interim Habitat Management Rec-

ommendations for the Northern Goshawk, Tongass National Forest 1992" will be implemented (Appendix H).

Cumulative Effects



The primary impacts on wildlife result from changes in habitats; therefore the reasonably foreseeable effects to the end of the APC Long-Term Timber Sale (year 2011) were estimated by calculating the acres of each VCU that would be harvested up to that date. Amounts of habitat projected to be harvested were used to evaluate effects on emphasis species.

Cumulative effects on wildlife habitats were derived from a combination of the analysis located in the TLMP Revision and data from wildlife habitat models found in GIS. The following discussion is based on that analysis.

Wildlife Habitats

It is estimated that 81 percent of the forested habitat in the study area would remain unaffected by timber harvest activities through 2011 (Table 3-81). The percent of unaffected forest habitat remaining by VCU varies from 64 percent in VCU 417 to 100 percent in VCUs 405.1, 416.1, and 417.1. The 19 percent of forested habitat affected would be in various stages of forest succession following timber harvest. These acres would provide varying wildlife habitat values as the forest matures. Timber harvest increases the number of forage areas and forage production due to sprouting vegetation. However, this would be a temporary condition because the forest canopy closes with increased tree growth. As the forest canopy closes and matures, forage production and accessibility for some animals will decline. Precommercial thinning will prolong forage production and open up the young stands. Eventually, hiding cover and thermal cover values of the maturing stand will increase.



Table 3-81

Percent of Various Wildlife Habitats Remaining Through 2011

VCU	Beach Fringe	Estuarine Fringe	Streamside Riparian and Oversteepened Slopes	Forested
398	88	100	98	75
399	91	97	86	73
400	100	100	96	76
401	100	100	100	94
402	98	97	95	73
405.1	0	0	100	100
416	94	89	91	76
416.1	100	0	0	100
417	85	0	100	64
417.1	100	0	0	100
418	93	100	85	70
419	80	96	95	74
420	93	99	70	79
421	86	100	99	76
Total	92	98	93	81

Source: Brainard, 1992

Beach Fringe

Ninety-two percent of the beach fringe habitat in the study area is estimated to remain unaffected by timber harvest activities through 2011 (Table 3-81). The percent of beach fringe remaining by VCU varies from 80 percent in VCU 419 to 100 percent in VCUs 400, 401, 416.1, and 417.1.

Estuarine Fringe

It is estimated that 98 percent of the estuarine fringe habitat in the study area would remain unaffected by timber harvest activities through the year 2011 (Table 3-81). The percent of unaffected habitat remaining by VCU would range from 89 percent in VCU 416 to 100 percent in VCU 400, 401, 418, and 421.

Streamside Riparian and Oversteepened Slopes

It is estimated that 93 percent of the streamside riparian habitat would remain unaffected by timber harvest through 2011 (Table 3-81). The percent of unaffected streamside riparian habitat remaining by VCU varies from 70 percent in VCU 420 to 100 percent in VCUs 401, 405.1, and 417. Any additional harvest along Class I streams or Class II streams that flow directly into Class I streams would be no closer to the stream banks than 100 feet. [Streamside riparian wildlife habitat is defined as being within 500 feet of the streambanks by length of stream accessible to fish. (TLMP Wildlife Task Force Working Report. TLMP6. April 1978)]



Old-Growth Habitat Blocks

Although a final decision has not yet been made, the Draft Supplement for the Revised Tongass Land Management Plan probably provides the most reliable direction of how old-growth habitat will be maintained through the year 2011. The Draft Forest Plan would maintain old-growth habitat in three primary ways.

The first would be through the allocation of land management prescriptions that would maintain old-growth characteristics. The semi-primitive recreation and other area management prescriptions would be applied to the peninsula to the west of Security Bay (VCUs 401 and 402). The semi primitive management prescription would be applied to an area around the mouth of Kadake Creek and the wild and scenic river prescription would be applied to both Kadake Creek and the creek known locally as Fall Dog Creek in the head of Security Bay.

The Draft Supplement for the Tongass Land Management Plan Revision allows for further protection designation at project level planning. In this project, the IDT has followed the recommendations of the Viability Committee of 1992. We have added two additional old-growth habitat blocks, Salt Lagoon and Cool Lake (see figure 3-16).

It is also significant that the remainder of Kuiu Island outside of the study area would remain in a natural state if the Land Management Plan is revised as proposed in the supplemental Draft. Tebenkof and South Kuiu Wildernesses are already established by Congress. Bay of Pillars and Rocky Pass would be allocated to Primitive and Semi-Primitive recreation prescriptions and the southern part of the island would be allocated to the Other Area management prescription.

The second major way in which old-growth habitat would be managed is through the maintenance of streamside, estuary, and beach fringe habitats. Although these habitats will not always be in block configurations, they will provide vital travel corridors as well as thermal, hiding, and forage habitat.

The third manner in which old-growth habitat will be maintained is on lands that are unsuitable for timber harvest because they are too steep to harvest without risk of soil erosion. All of the acres of the various habitats discussed are essentially in old-growth condition.

Wildlife Species

Sitka Black-tailed Deer



It has been estimated that 81 percent of the forested habitat and 85 percent of the winter deer range would remain unaffected by timber harvest activities through 2011 (Alaska Pulp Corporation Long-Term Timber Sale Contract, Supplemental Environmental Impact Statement for the 1981-86 and 1986-90 Operating Periods, Analysis Area 12, page 4-59). The resulting change in those habitats would probably lead to a reduced carrying capacity for black-tailed deer. The habitat capability model indicates that potential deer numbers would be reduced to 86 percent of their 1961 level by 2011 and to 68 percent by 2080. These projections include reductions from second growth development.

Black Bear

Timber harvest effects on the black bear are not expected to be substantial. Their high use of streamside riparian, estuarine fringe and beach fringe habitats indicate the importance of these areas to black bears. The levels of harvest should give a relative indication in the cumulative effects on these animals. Very little harvest is proposed in important black bear habitat in the alternatives considered in this analysis. It is estimated that by 2011 these habitats would remain at 70 to 100 percent of the original amounts in most VCUs (Table 3-81).

Black bear have proven to be generally tolerant of human disturbance. A small decline of the black bear population is expected as some of the important habitat is harvested and as hunters harvest black bears under the sport and subsistence regulations.

Marten

Seventy-nine percent of the forested habitat would remain unaffected by timber harvest activities through 2011 (Table 3-81). The habitat reduction associated with timber harvest would probably lead to a proportional reduction in carrying capacity for pine marten.

The long-term effects of timber harvest would decrease the potential marten habitat to 54 percent of their 1961 levels by 2011 and 40 percent by 2080. These projections include reductions from second growth development and additional timber harvest proposed in the Forest Plan.

Carrying capacity for the marten should increase again as regenerated forests in harvest units mature. However, it is not expected that a stand will return to the carrying capacity for martens of the original stand while managed on a 100-year rotation.

River Otter

River otters generally occur in close proximity to the beach (Larsen, 1983 and Woolington, 1984) within areas identified as beach fringe habitat. Eight percent of the beach fringe habitat has already been harvested. Minor timber harvest is anticipated in this habitat type (less than one percent) due to road and possible LTF construction. This will leave approximately 92 percent of the beach fringe unaffected by timber harvest through 2011.

Bald Eagle

It is estimated that the buffer zone of some additional eagle nest trees could be infringed upon by timber harvest activities through 2011. These infringements will be dealt with under a Memorandum of Understanding between the Forest Service and the US Fish and Wildlife Service to assure that they would have no effect on carrying capacity for Bald Eagles (Forest Service, 1984). Normal procedure is not to harvest within 330 feet of known nest trees. Harvest in beach fringe area or estuarine fringe will proportionally reduce the capacity of the habitat to produce future nest trees.



Vancouver Canada Goose

Vancouver Canada geese nest in the inland wetland, estuarine fringe and forested habitats. Within these habitats they often select noncommercial or low-volume forested sites. Harvest of these habitats could affect Vancouver Canada geese.

It is estimated that 86 percent of the inland wetland, 94 percent of the estuarine fringe, and 81 percent of the forested habitats would remain unaffected by timber harvest activities through 2011. These levels of estimated timber harvest could reduce the carrying capacity for geese in the study area. However, it is anticipated that the amount of reduction in carrying capacity would be small, and probably not proportional to the reduction of habitat as Vancouver Canada geese are probably not limited by the abundance of nesting habitat.

Other Environmental Considerations

Unavoidable Adverse Environmental Effects

Implementation of any action alternative would result in some adverse environmental effects that cannot be effectively mitigated or avoided if the proposed action is to take place. The interdisciplinary procedure used to identify specific harvest units and roads was designed to eliminate or lessen the significant adverse consequences. In addition, the application of standards and guidelines and mitigation measures are intended to further limit the extent, severity, and duration of these effects. The specific environmental effects of the alternatives were discussed earlier in this chapter, and the proposed mitigation measures are discussed in Chapter 2. Although the formulation of the alternatives included avoidance of potentially adverse environmental effects, some adverse impacts to the environment which cannot be completely mitigated are expected to occur.

Some adverse effects are of a transitory type. For example, air quality will diminish on a recurring, though temporary, basis due to the road construction, timber harvest, timber hauling and recreation traffic on untreated roads, and the operation of internal combustion engines. These activities will have localized and temporary adverse effects on air quality where these activities occur.

Although standards and guidelines and BMPs are designed to prevent significant adverse effects to soil and water, the potential for adverse impacts does exist. Sediment production would increase if roads are built and timber is harvested. Sediment would be produced by surface erosion, channel erosion, and mass movement.

Ground-disturbing activities would temporarily increase sediment loads in some streams. This could displace fish, reduce anadromous and resident fish reproductive success, and alter aquatic invertebrate populations. In addition, a loss of fish habitat could occur at stream crossings. The portion of a stream bed occupied by a culvert or other structures could be lost as fish habitat.

Disturbance, displacement, or loss of fish and wildlife may occur as a consequence of habitat loss and increased human activity in project areas. New road construction, and the human activities associated with new access to areas previously unroaded, will result in impacts to fish and wildlife. Improved access into areas that previously had limited roads would have similar effects. The proposed activities will also increase competition for subsistence resources.

Both the amount and distribution of mature and old-growth stands would be reduced through implementation of any action alternative. The rate and severity of adverse impacts varies by alternative. Because some wildlife species rely on habitat conditions provided by old-growth stands, the reduction in the populations of some wildlife species can be expected. As old-growth and mature timber stands are converted to young even-aged stands,

the capability of the Project Area to provide optimal habitat for old-growth dependent species would be reduced.

Timber harvest and road construction in areas that are currently unroaded will alter natural characteristics of these areas. This will modify the recreational experiences that are offered by these areas. Both primitive and semi-primitive recreational opportunities will be lost by these actions.

The natural landscape will appear visually altered by timber harvest, particularly where logging activity is highly visible from travel routes. These adverse effects will eventually be reduced by growth of vegetation. Other impacts on the natural appearance of the landscape include roads and structures which are highly visible despite efforts to blend them with land forms and mitigate the effect by landscaping.

The intensity and duration of these effects depends on the alternative and the mitigation measures applied to protect the resources. Most unavoidable effects are expected to be short-term (usually less than 2 years). Others, such as the loss of old-growth wildlife habitat, will be long-term. In all cases, the effects would be managed to comply with established legal limits, such as a maximum time for regeneration. To check and reduce these effects, monitoring procedures and mitigation measures are proposed for those areas that may be affected.

Relationship Between Short-Term Uses and Long-Term Productivity

All alternatives would come under the mandate of the Multiple Use and Sustained Yield Act of 1969, which requires the Forest Service to manage national forest lands for multiple uses, including timber, recreation, fish and wildlife, range, and watershed. All renewable resources are to be managed such that they are available for future generations. The harvesting and use of standing timber can be considered a short-term use of a renewable resource. As a renewable resource, trees can be reestablished and grow again if the productivity of the land is not impaired.

Maintaining the productivity of the land is a complex, long-term objective. All alternatives protect the long-term productivity of the Project Area through the use of specific standards and guidelines, mitigative measures, and BMPs. Long-term productivity could change as a result of various management activities proposed in the alternatives. Timber management activities will have direct, indirect, and cumulative effects on the economic, social, and biological environment.

Soil and water are two key factors in ecosystem productivity, and these resources will be protected in all alternatives to avoid damage which could take many decades to rectify. Sustained yield of timber, wildlife habitat, and other renewable resources all rely on maintaining long-term soil productivity. Quality and quantity of water from the Project Area may fluctuate as a result of short-term uses, but no long-term effects to the water resource are expected to occur as a result of timber management activities.

All alternatives would provide the fish and wildlife habitat necessary to maintain viable, well-distributed populations of existing native and desired non-native vertebrate species throughout the Project Area. The abundance and diversity of wildlife species depends on the quality, quantity, and distribution of habitat, whether used for breeding, feeding, or resting. Management Indicator Species (MIS) are used to represent the habitat requirements of all fish and wildlife species found in the Project Area. By managing habitats and populations of indicator species, the other species associated with the same habitat would also benefit. The alternatives provide standards, guidelines, and mitigation measures for maintaining long-term habitat and species productivity. The alternatives vary in the risk presented to both wildlife habitat and habitat capability.

Timber rotations are normally over 100 years. To ensure adequate production of timber, harvest has been scheduled to allow the earliest cut stands to mature into merchantable timber before the planned harvest of original stands is complete. When the first rotation is complete, mature timber stands would be harvested again on a new rotation. Management of the timber resource on these rotations could affect long-term productivity depending on the intensity of silvicultural practices. Projected timber rotation lengths are not anticipated to affect long-term productivity. Mitigation measures are planned under all the alternatives to ensure future availability of other renewable resources as well.

Opportunities for dispersed recreation use, including hiking, camping, fishing, hunting, using all-terrain-vehicles, and viewing the natural scenery, will be maintained and increased for future generations. The setting in which these activities occurs varies by alternative, but the long-term potential of the Project Area to provide a spectrum of recreation opportunities would be maintained in all alternatives.

While some timber management practices reduce long-term productivity by causing soil erosion or loss of habitat critical to fish and wildlife species, the desired future condition of the Project Area under the preferred alternative will maintain integrated ecological functions. For example, timber management activities such as timber harvesting and road construction alter the natural-appearing landscape and have adverse effects on the water quality, soil productivity, and interior forest habitat values. These impacts will be reduced by riparian protection standards, use of BMPs for road construction, use of silvicultural systems other than clearcutting, retention of snags and large down woody material in harvest units, and protection of large tracts of older forest habitat distributed within the managed forest landscape.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are decisions to use, modify, or otherwise affect non-renewable resources such as cultural resources or minerals. Irreversible commitments could also apply to resources that are renewable only over a long period of time such as soil productivity or old-growth forests. Such commitments of resources are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or the resource has been destroyed or removed. All alternatives result in some irreversible commitments, although the extent and potential for adverse effects increase in alternatives which emphasize resource extraction and utilization.

Irretrievable commitments represent opportunities foregone for the period of the proposed actions, during which other resource utilization cannot be realized. These decisions are reversible, but the utilization opportunities foregone are irretrievable. Under multiple-use management, some irretrievable commitments of resources are unavoidable due to the mutually exclusive relationship between some resources. An example of such a commitment is development at logging camps and LTFs that will be removed at the completion of logging activities. These developments occupy approximately 3 to 5 acres, and include bunkhouses, mobile homes, fuel storage facilities, etc. For the 3 to 5 years that such developments exist, the opportunity to otherwise utilize these areas is foregone, thus irretrievable.

The irreversible disturbance of some types of cultural resources may occur as a consequence of management activities. This would be especially true for subsurface resources that cannot be located through surface surveys. Even with mitigation, unanticipated or unavoidable disturbances can result in the loss of cultural values. Mitigation efforts such as data recovery involve the scientific and controlled destruction of a cultural resource site. Once undertaken, the effects are irreversible and the mitigation effort becomes an irretrievable commitment to the resource.

The use of energy resources and the removal of mineral resources are irreversible commitments of resources. The utilization of rock resources for road and facility construction would be an example. The use of fossil fuels during project administration activities would be an irreversible resource commitment. Alternatives vary by the amount of energy and mineral resources used; only the No Action alternative abstains from the use of these non-renewable resources at this time.

In unroaded areas, development activities such as timber harvest and the road construction associated with harvest will irreversibly reduce the potential amount of area that could be designated as a part of the National Wilderness Preservation System, managed as a Research Natural Area, or managed for other purposes requiring natural characteristics.

An irreversible loss occurs when forests of old-growth trees are harvested, fragmented, or removed for the construction of roads, or other purposes. Old-growth stands provide key wildlife habitat and are also valued for ecological and aesthetic reasons. Because old-growth stands can take 200 years or more to develop, the harvest of this resource has irreversible impacts on fish and wildlife resources associated with timber. However, with intensive rehabilitation and restoration, these areas could return to old-growth timber following 200+ years. Unless the commitment to rehabilitate is ensured, the loss of habitat is irreversible and irretrievable.

Some long-term uses of the land cause an irreversible loss of soil productivity. Examples of these uses include the establishment of arterial and collector roads and log-transfer facilities.

Possible Conflicts Between Alternatives and Other Land Use Objectives

The regulations for implementing the National Environmental Policy Act (NEPA) require a determination of possible conflicts between the proposed action and the objectives of Fed-

eral, State, and local land use plans, policies, and controls for the area. The major land use regulations of concern are the Coastal Zone Management Act (CZMA), Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA), and the State of Alaska's Forest Practices Act. A discussion of each of these determinations is presented below.

Coastal Zone Management Act of 1976 (CZMA)

The CZMA was passed by Congress in 1976 and amended in 1990. This law as amended requires Federal agencies conducting activities or undertaking development affecting the coastal zone to ensure that the activities or developments are consistent with approved State coastal management programs to the maximum extent practicable. The State of Alaska passed the Alaska Coastal Management Act in 1977 to establish a program that meets the requirements of the CZMA. It contains the standards and criteria for a determination of consistency for activities within the coastal zone.

Forest Service requirements for consistency are detailed in a Memorandum of Understanding between the State of Alaska and the Regional Forester, dated October 8, 1981. Standards against which the consistency evaluation will take place are: Alaska Statute Title 46, Water, Air, Energy, and Environmental Conservation; and the Alaska Forest Practices Act of 1990.

The Forest Service has evaluated the preferred alternative to ensure that the activities and developments affecting the coastal zone are consistent with standards for the Alaska Coastal Management Program. Comments on the draft preferred alternative by the State of Alaska were considered in the evaluation. That evaluation indicates that the activities proposed in the alternatives, and the standards and guidelines applicable to those activities, meet or exceed the standards of the Alaska Coastal Management Program.

Alaska National Interest Lands Conservation Act of 1980 (ANILCA)

Under Section 810 of ANILCA, agencies are required to evaluate the effects of proposed actions on subsistence uses of Federal land and to determine if the proposed action might significantly restrict subsistence opportunities. Refer to the Subsistence section of this chapter for the evaluation of impacts to subsistence use as a result of the alternatives.

State of Alaska Forest Practices Act of 1990

On May 11, 1990, Governor Cowper approved the legislatures's major revision of the State's Forest Practices Act (FPA). The revised act significantly increases the State's role in providing protection and management for important forest resources on State and private lands. The revised Forest Practices Act will also affect national forest management through its relationship to the ACMP and the Federal CZMA (see above discussion). For national forest timber operations, such as proposed for the North and East Kuiu Project, the effect of the revised Forest Practices Act is essentially two-fold. First, it clarifies that the revised Forest Practices Act is the standard which must be used for evaluating timber harvest activities on Federal lands for purposes of determining consistency to the maximum extent practicable with the Alaska Coastal Zone Management Program. Second, it calls for minimum 100-foot buffers on all Class I streams, and recognizes that consistency to the maximum extent possible for purposes of the Alaska Coastal Management Program is attainable in Federal timber

harvest activities using specific methodologies which may differ from those required by the revised Forest Practices Act or its implementing regulations.

The Tongass Timber Reform Act of 1990 prohibited commercial timber harvesting within buffer zones established on all Class I streams, and those Class II streams which flow directly into a Class I stream. Buffer zones have a minimum width of 100 feet slope distance from the edge of either side of the stream. In addition, the Forest Service is currently working with the Alaska State Division of Government Coordination on a revision of the Memorandum of Understanding (MOU) between the State and the Forest Service. This revised MOU will establish the policies and procedures for coordinating State review of Forest Service programs and activities, including those covered by the Forest Practices Act and the Alaska Coastal Management Program.

Energy Requirements and Conservation Potential of Alternatives

The implementation of the proposed actions in the North and East Kuiu Project require the expenditure of energy (e.g., fuel consumption). The amount of energy used varies by alternative based on timber volume harvested and miles of road constructed or reconstructed. The direct effect of the alternatives on energy requirements would be attributed to timber harvest, roaded construction and reconstruction, and travel necessary to administer the timber sale. Indirect energy requirements include wood products and the transport of the products to secondary processors and consumers. The estimated total fuel consumption required for each alternative is displayed in the following table.

Table 3-82				
Estimated Fuel Consumption (millions of gallons) ¹				
	Alternative			
	1	2	3	4
Preparation and Administration (1.56 gallons/MBF)	0	0.16	0.18	0.18
Logging and Transportation (14.8 gallons/MBF)	0	1.51	1.72	1.75
Road Construction and Maintenance (4,000 gallons/mile)	0	0.32	0.45	0.37
Total Consumption	0	1.99	2.38	2.30
Source: Condon, 1992				
¹ The estimated fuel consumption for timber harvest activities is based on consumption per MBF of sawlog volume. Sawlog volume is estimated to be 79% of the total volume harvested.				

Natural or Depletable Resource Requirements and Conservation Potential of Alternatives

All alternatives considered in detail are designed to conform to applicable laws and regulations pertaining to natural or depletable resources, including minerals and energy resources. Regulation of mineral and energy activities on the National Forest, under the U.S. Mining Law Act of May, 1872, and the Mineral Leasing Act of February, 1920, is shared with the Bureau of Land Management (BLM). The demand for access to National Forest lands for the purpose of mineral and energy exploration and development is expected to increase over time.

The action alternatives propose road construction that will increase opportunities for access to the National Forest within the North and East Kuiu Project Area. This increased access may result in increased activity with regard to both known and potential mineral or energy resource occurrences.

Urban Quality, Historic and Cultural Resources and the Design of the Built Environment

The North and East Kuiu Project Area contains no urban areas or built-up area of any kind. Therefore, the only applicable concern under this topic is with historic and cultural resources. The goal of the Forest Service's Cultural Resource Management Program is to preserve significant cultural resources in their field setting and ensure they remain available in the future for research, social/cultural purposes, recreation, and education. The direct, indirect, and cumulative effects of the alternatives on cultural resource have been evaluated. The result of this evaluation is the determination that there are adequate standards, guidelines, and procedures to protect cultural resources and to meet the goals of the Cultural Resource Management Program. Cultural resources are discussed further in the Cultural section of this chapter.

Effects of Alternatives on Consumers, Civil Rights, Minorities, and Women

All Forest Service actions have the potential to produce some form of impact, positive and/or negative, on the civil rights of individuals or groups, including minorities and women. The need to conduct an analysis of this potential impact is required by Forest Service Manual and Handbook direction. The purpose of the impact analysis is to determine the scope, intensity, duration, and direction of impacts resulting from a proposed action. For environmental or natural resource actions, such as proposed for the North and East Kuiu Project, the civil rights impact analysis is an integral part of the procedures and variables associated with the social impact analysis. This analysis is discussed in this chapter in the section on the Economic and Social Environment.

The effect of the alternatives on consumers is reflected in the discussion of the various goods and services supplied as a result of the proposed actions. This analysis occurs throughout the chapter as an integral part of the analysis of the effects on other components of the environment.

All alternatives are in keeping with the intent of Secretary of Agriculture Memorandum 1827 for prime land. The project area does not contain any prime farm lands or rangelands. Prime forest land does not apply to lands within the national forest system. In all alternatives, lands administered by the Forest Service would be managed with a sensitivity to the effects on adjacent lands.

Effects of Alternatives on Threatened and Endangered Species and Critical Habitat

There will be no adverse impacts to any Federally listed threatened and/or endangered species or critical habitat as a result of this project. The Humpback whale and the Stellar's sealion are known threatened and/or endangered species that inhabit waters near the project area. The Arctic and American peregrine falcons are migrant species that pass through the project area in the spring and fall of the year. Consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service has resulted in a determination that there would be no effect to threatened or endangered species by any of the alternatives proposed for this project. The discussion of the effects of the alternatives on threatened and/or endangered species is presented in the Chapter 3 *Introduction*, *Wildlife*, and *Fisheries* sections.



Chapter 4

List of Preparers

List of Preparers

Dick Aho, Fisheries Biologist

M.S. Fisheries, Oregon State University, 1975

B.S. Wildlife Science, Oregon State University, 1970

Forest Service: 10 years.

Area Fisheries Biologist, Tongass National Forest, 10 years.

Other Employment:

Fisheries Biologist, Oregon Department of Fish and Wildlife, 5 years.

Rob Aiken, Civil Engineer/Transportation Planner

B.S. Forest Engineering, Oregon State University

Forest Service: 12 years.

Civil Engineer, Stikine Area, 7 years;

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4 List of Preparers

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Bachelor's of Landscape Architecture, University of Washington, 1980

Forest Service: 11 years.

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Landscape Architect, Tongass N.F., Stikine Area, 4 years.

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Graduate Studies:

Business Administration and Economics, California State University, Chico
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Land Management Planning Team Leader, Lassen N.F., 2.5 years;
Forest Economist, Lassen N.F., 2.5 years;
Fire Management, Lassen N.F., 7 years;
Fire Management, Eldorado N.F., 1 year;
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Graduate Studies, Colorado State University and Washington State University

Forest Service: 22 years.

Stikine Area Planning Biologist, 3 years ;
Wilderness/Wildlife Forester, Bitterroot N.F., 10 years;
Forester, Timber Management, Bitterroot N.F., 5 years;
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Bob Gerdes, Interdisciplinary Team Leader, Forester

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4 List of Preparers

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- Civil Engineering Technician, Idaho Panhandle N.F. 2 years;
- Civil Engineering Technician, Stikine Area, Tongass N.F. 2 years;
- Civil Engineering Technician, Clearwater N.F. 2 years;
- Civil Engineering Technician, Payette N.F. 3 years;
- Civil Engineering Technician, Shasta Trinity N.F. 2 years.

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B.S. Hydrology, Wildland and Watershed Management, Utah State University

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Everett Kissinger, Soils Scientist

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Forest Service: 14 years.

- Forest Soils Scientist, Stikine Area, Tongass N.F.;
- Watershed Staff Officer, Stikine Area, Tongass N.F.;
- Soil Scientist with USDA Soil Conservation Service, 10 years.

Jay Kittams, Stikine Area Silviculturist

B.S. Forestry, University of Montana

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- Forester/Silviculturist, Tongass N.F. ;
- Forester, Salmon N.F. ;
- Forester, Boise N.F. ;
- Forestry Technician, Intermountain Forest and Range Experiment Station.

Mark McCallum, Archaeologist

B.A. Anthropology, James Madison University

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Forest Archaeologist, Stikine Area, Tongass N.F.

Other Employment:

Private Consultant, 10 years.

Larry Roberts, Subsistence Coordinator

B.A. Anthropology, California State University, Stanislaus, 1974

M.S. Anthropology, California State University, Chico, 1978

Forest Service: 12 years.

Regional Subsistence Coordinator, Region 10, 3 years;

Subsistence Coordinator, Tongass N.F., Stikine Area, 1 year;

Forest Archaeologist, Tongass N.F., Stikine Area, 7 years.

Julianne Thompson, Forest Hydrologist

B.S. Natural Resources Management

Forest Service: 4 years

Forest Hydrologist, Tongass N.F., Stikine Area, 1 year;

Forest Hydrologist, Dixie N.F., 3 years.

Other Employment:

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3 years.

Chapter 5

List of Document Recipients

Listing of Document Recipients

List of Agencies, Organizations, and Individuals on the Mailing List for the North and East Kuiu Project FEIS Summary.

(Packet includes Summary, ROD, and Maps)

AK DNR, Div. Parks & Out. Rec.	Tom Crane
AK Dept. of Transportation & Public Facilities-SE Planning	Peter Crimp
Alaska Marine Advisory Program	Roland Curtis
AK Professional Hunters Assoc.	Judy Daniels
Alaska Public Radio Network	Rebecca Daniels
Fred Angerman, Sr.	Jack Devine
Ralph A. Bache	Joe Doerr
Holly Bashelier	Lesla Duncan
Bobbie Benitz	Ernie Eads
Guy Bennett	Jennifer Eden
Robert Bennett	Bruce Engdahl
Wolf & Denise Benson	John Enge
Bret Blosser	ETI Explosives
Peter Branson	Leslie Fahey
Bruce Brunette	Lissa Fahlman
Richard & Sharon Burrell	Ralph Fenner
Dave & Celia Carlson	Truman Fenton
William Cheney	Don Ford
Tim Chittenden	Joni Gates
Kimberly Christensen	John Geddie
City & Borough of Sitka	Marilyn George
Marlene Clarke	Virgil, Jean & Steven Gile
Ronald Compton	Marian Glens
	Daniel & Teresa Goodwin

Dave Grebe
Lawrence Hall
Jim Hammer
Joel & Alice Hanson
Lloyd Harding
Heli-Lift Co.
Paul C. Herd
Don Hernandez
Harold Hewitt
Oliver Hofstad
Jeff Hood
Guy & Ann Hoppen
Scott & Julie Hursey
Inner Voice
Mike A. Jackson
John Johnson
Honorable Lloyd Jones, Senator
Juneau Empire
Kake Tribal Logging Corp.
KCAW Raven Radio
David Kensinger
Cathy Kirschenmann
Klukwan Forest Products
Klukwan Forest Products, Inc.
Paul Korchak
Tamar Krames
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Landau Associates, INC.
Stan & Sharon Langaker
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Matthew Leone
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Kerry Maeder
Kenneth Mason
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David McFadden

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Patricia Norheim
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Northern SE Aquaculture Assoc.
Charles Oliver
Outdoor Adventures
Bruce Parker
Steve Peavey
Jay & Carolyn Pritchett
Bill Privett
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Petersburg High School
Gerhart Rathbone
Sean Reilly
Mike & Bev Reitz
Robertson, Monagle, and Eastaugh
Thomas Rockne
Rocky Mountain Helicopters
Dennis Rogers
Eric Rosvold
Daniel Savone & Bonnie Westlun
Slim Schwartz
Louise Shilts
Sierra Club Anchorage Group
Ronald Simpson
Slickrock Adventures
Ted Smith
Roy Sokol
Stephen Stocks
Martin Susort
Honorable Robin Taylor
Temsco
Joe Teter

Tom Thornton
 Trading Union, Inc.
 Richard Ubernaga
 US Navy
 USDA Soil Conservation Service
 John Vowell
 Ginger Watkins
 Burl Weller
 Kurt Welser
 Russ Westmark
 Wrangell Fisheries, Inc.
 Wrangell Resource Council
 Syd Wright
 Ken Wyrick

List of Agencies, Organizations and Individuals on the Mailing List for the North and East Kuiu Project FEIS

(Packet includes the complete FEIS including the Summary, ROD, and Maps)

Alaska Aquaculture, Inc.	James P. Bailey, Attorney
AK Dept. Environ. Conservation	Dave & Kerry Beebe
ADF&G	Judy Brakel
ADF&G, Sport Fish	Judy Brakett
ADF&G, Subsistence	Lew Bresee
AK DNR, Division of Forestry	Campbell Towing
AK DNR, Division of Land	Don, Rachel & Kathryn Chaney
AK Division of Governmental Coord.	Chat & Jo Chatham
Alaska Forest Association	Chugach Forest Products
Alaska Forest Association	Edward P. Churchill
Alaska Glacier Seafood	City of Kake, Lonnie Anderson, Mayor
Alaska Log Salvage	City of Kupreanof
Alaska Natural Heritage Prog.	Claire Cochran
Alaska Pulp Company	Colorado State University, Library
Alaska Pulp Corporation	Luke & Linda Cramer
AK Pulp Corporation	Paul Davis
Alaska Pulp Corporation	Michael Dixon
AK Southeast Regional Office	John Edgington
American Rivers	Larry Edwards
Richard Angerman	Bill & Beth Flor

Kurt Flynn	Olive Cove Homeowners Assoc.
David Glen	Craig Olson
Gretchen Goldstein	Darryl Olson
Joel Goodkind	Organized Village of Kake
Frank Gordon	Pacific Wing
Morris Grant Sr.	Wayne Parks
Donald P. Griswold	Ned Pence
Walter Holman	Warren Powers
Bruce Jackson	Petersburg Pilot
Clarence Jackson, Sr.	Petersburg Public Library
Clarence Jackson, Jr.	David Randrup
Rosalind Jackson	Lon Riesberg
Candace L. Jones	Honorable Ed Rilatos, Mayor
Marvin Kadake	Ernie Rogers
Joan Kautzer, Alaska Women in Timber	John & R'Nita Rogers
Ketchikan Pulp Company	Kathryn Schneider
Ketchikan Pulp Corporation	Robert Schwartz
Ketchikan Pulp Corporation	Sealaska Corporation
Ketchikan Sports & Wildlife	Seley Corporation
KFSK Public Radio	Thyes Shaub
Everett Kissinger	Bob Sicard
Rebecca Knight	Sierra Club Auke Bay Group
Don & Barbara Koenigs	Sierra Club Legal Defense Fund
Leo Kondro	Sierra Club, Jack Hession
KTOO TV	Sitka Conservation Society
Richard Lampe	Richard Smith
Stuart Mach	South Kuiu Thlingit Nation
Enid Magill	SE AK Conservation Council
Jane Manning	Southeast AK Forest Dwellers
Dale Marden	Southeast Exposure
Mason, Bruce & Girard, Inc.	Jim Spignesi
Matthews Timber Company	Richard Sprague
Rebecca McKennett	Honorable Sharon Sprague
Michael Medalen	John Stark
Beth Mullan	Nathan Steele
Honorable Frank Murkowski	Richard Strauss
National Bank of Alaska	The Wilderness Society, AK Region
National Outdoor Leadership School	Erting Thynes
	Randy Timothy

Tongass Conservation Society
Katherine Troll
Trout Unlimited
U of A, Social/Economic Res.
US Army Corps of Engineers
US Coast Guard 7th District
US Dept. Commerce, NOAA
US Dept. Commerce, NOAA, NMFS
US Dept. Comm., NOAA, NMFS
US EPA, Alaska Operations
US EPA, Alaska Operations
US EPA, Region X
US Federal Agency Liaison Div.
USFS, Dir. Environmental Coord
USDA, EPA - Region 10
USDI, Office of Env. Affairs
USDI, Fish & Wildlife Service
USDI, Fish & Wildlife Service
USFS, Tongass NF, Chatham Area
USFS Tongass NF, Ketchikan Area
Charles P. Van Epps
Vanguard Research
Ken Vaughan
Wesley Rickard, Inc.
Harry Wilson
Wings of Alaska Flying Service
Charles Wood
Phyllis Woolwine
Max Worhatch



Chapter 6

Glossary

Glossary

Acronyms Used in Text

ACMP	Alaska Coastal Management Program
ADF&G	Alaska Department of Fish and Game
AHMU	Aquatic Habitat Management Unit
ANSCA	Alaska Native Settlement Act of 1971
ANILCA	Alaska National Interest Lands Conservation Act of 1980
APC	Alaska Pulp Corporation
ASQ	Allowable Sale Quantity
BLM	Bureau of Land Management
BMP	Best Management Practices
CFL	Commercial Forest Land
CFR	Code of Federal Regulations
CMP	Corrugated Metal Pipe
CMPA	Corrugated Metal Pipe Arch

6 Glossary

CZMA	Coastal Zone Management Act of 1976
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EVC	Existing/Expected Visual Condition
FEIS	Final Environmental Impact Statement
FPA	Forest Practices Act
FSH	Forest Service Handbook
FSM	Forest Service Manual
GIS	Geographic Information System
GMU	Game Management Unit
IDT	Interdisciplinary Team
KV	Knutsen-Vandenberg Act
LTF	Log Transfer Facility
LUD	Land Use Designation
LWD	Large Woody Debris
MBF	One Thousand Board Feet
MIS	Management Indicator Species
MMBF	One Million Board Feet
MOA	Memorandum of Agreement

NEPA	National Environmental Policy Act of 1969
NFMA	National Forest Management Act
NOI	Notice of Intent
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
RVD	Recreation Visitor Day
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Officer
TLMP	Tongass Land Management Plan
TRUCS	Tongass Resource Use Cooperative Survey
TTRA	Tongass Timber Reform Act
USDA	United States Department of Agriculture
VCU	Value Comparison Unit
VQO	Visual Quality Objective
WAA	Wildlife Analysis Area

Terms Used in Text

Alaska National Interest Lands Conservation Act (ANILCA)

Passed by Congress in 1980, this legislation designated 14 national forest wilderness areas in southeast Alaska. In section 705(a) Congress directed that at least \$40,000,000 be made available annually to the Tongass Timber Supply Fund to maintain the timber supply from the Tongass National Forest at a rate of 4.5 billion board feet per decade. Section 810 requires evaluation of subsistence impacts before changing the use of these lands.

Alaska Native Claims Settlement Act (ANSCA)

ANSCA, which became law on December 18, 1971, provides for the settlement of certain land claims of Alaska natives and for other purposes.

Alaska Pulp Corporation (APC)

Previously Alaska Lumber and Pulp Corporation

Alevin

Larval salmonoid that has hatched but has not fully absorbed its yolk sac, and generally has not yet emerged from the spawning gravel.

Allowable Sale Quantity (ASQ)

ASQ refers to the maximum quantity of timber that may be sold each decade from the Tongass National Forest. This quantity, expressed as a board foot measure, is calculated based on the timber utilization standards specified in the Alaska Regional Guide, the number and type of acres available for timber management, and the intensity of timber management.

Alpine/Subalpine Habitat

The region found on mountain peaks above conifer stands.

Arterial Road

A forest road that provides service to large land areas and usually connects with other arterial roads or public highways.

Beach Fringe Habitat

Habitat that occurs from the intertidal zone inland 500 feet, and islands of less than 50 acres. This habitat is especially important to marine and upland species.

Benthic Habitat

Refers to the substrate and organisms on the bottom of marine environments.

Best Management Practices (BMP)

Land management methods, measures or practices intended to minimize or reduce water pollution. Usually BMPs are applied as a system of practices rather than a single practice. BMPs are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility.

Biodiversity

Variety of life and its processes.

Buffer

Tongass Timber Reform Act requires that timber harvest be prohibited in an area no less than 100 feet of uncut timber in width from each side of all Class I streams and Class II streams which flow directly into Class I streams. This 100-foot area is referred to as a buffer.

Cant

A log that has been partly or wholly cut and is destined for further processing. Tongass National Forest Timber is sometimes cut into cants to prior to export to satisfy laws requiring at least partial processing of national forest timber prior to export.

Carrying Capacity

The healthy population that a given area can support without undergoing habitat degradation.

Clearcut Regeneration Method

The objective of this regeneration method is to provide site conditions favorable for the establishment, growth, and management of desired species. Cool growing conditions, wet soils, strong winds, shallow rooted trees, abundant natural regeneration, and economic factors in southeast Alaska make this regeneration method the most desirable on most areas for stand establishment and management.

Collector Road

A forest road that serves smaller land areas than an arterial road. Usually connects forest arterial roads to forest local roads or terminal facilities.

Commercial Fishery

Fish, shellfish, or other fishery resources taken or processed within a designated area for commercial purposes.

Commercial Forest Land

Productive forest land that is producing, or capable of producing, crops of industrial wood and is not withdrawn from timber utilization by statute or administrative regulation. This includes areas suitable for management and generally capable of producing in excess of 20 cu-

bic feet per acre of annual growth, or in excess of 8,000 board feet net volume per acre. It includes accessible and inaccessible areas.

Standard CFL: Timber that can be economically harvested with locally available logging systems such as highlead or short-span skyline.

Nonstandard CFL: Timber that cannot be harvested with locally available logging systems and would require the use of other logging systems such as helicopter or longspan skyline.

Conveyance

The passing of the title of a property from one owner to another.

Cruise

Refers to the general activity of determining timber volume and quality.

Cultural Resources

Historic or prehistoric objects, sites, buildings, structures, and so on, that result from past human activities.

Culturally Modified Tree

A culturally modified tree is a tree over 50 years old that has been intentionally altered by indigenous people participating in the traditional utilization of the forest.

Cumulative Effects

Cumulative effects are the impacts on the environment resulting from the addition of the incremental impacts of past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such action. Cumulative impacts can result from individually minor but collectively significant actions occurring over time.

Deer Winter Range

A combination of environmental elements that support Sitka black-tailed deer under moderately severe or severe winter conditions. Usually associated with high volume old-growth stands at low elevation and south aspects.

Direct Employment

The jobs that are immediately associated with a given activity. In the case of this Long-Term Timber Sale, employment in the logging, sawmill, and pulpmill, would be examples of direct employment.

Dispersed Recreation

Recreational activities that are not confined to a specific place.

Draft Environmental Impact Statement (DEIS)

A statement of environmental effects for a major Federal action released to the public and other agencies for comment and review prior to a final management decision. (Required by Section 102 of the national Environmental Policy Act.)

Estuarine Fringe Habitat

This habitat type is located within a 1,000-foot zone around an estuary. It is especially important for shorebirds, waterfowl, bald eagles, and other marine-associated species.

Estuary

For the purpose of this EIS, estuary refers to the relative flat, intertidal, and upland areas generally found at the heads of bays and mouths of streams. They are predominately mud and grass flats and are unforested except for scattered spruce or cottonwood.

Even-Aged Stand Management

A stand management strategy usually results in trees of one or two age classes within the stand. There are usually one or two entries which create site conditions favorable for seedling establishment. The three even-aged regeneration methods are seed tree, shelterwood, and clearcut. Stand regulation is simply managed by using one rotation age for a stand. The associated management costs are greatly reduced because of fewer harvest entries and stand treatments. Biological diversity is generally measured within the larger landscape or forest rather than within the even-aged stand.

Existing Visual Condition (EVC)

The level of visual quality or condition presently occurring on the ground. The six existing visual condition categories

are:

Type I: These are areas to be untouched by human activities.

Type II: Areas in which changes in the landscape are not noticed by the average person, but they do not attract attention. The natural appearance of the landscape still remains dominant.

Type III: Areas in which changes on the landscape are noticed by the average person, but they do not attract attention. The natural appearance of the landscape still remains dominant.

Type IV: Areas in which changes in the landscape are easily noticed by the average person and may attract some attention. The natural appearance of the landscape is noticeable, it may resemble a natural disturbance.

Type V: Areas in which changes in the landscape are obvious to the average person. These changes appear to be major disturbances.

Type VI: Areas in which changes in the landscape are in glaring contrast to the natural landscape. The changes appear to be a drastic disturbance.

Fish Habitat

The aquatic environment and the immediately surrounding terrestrial environment that, combined, afford the necessary physical, biological support systems required by fish species during the various life stages.

Fish Habitat Capability

The carrying capacity or the maximum number of fish the habitat can produce. Habitat capability is measured in smolts for anadromous fish and in numbers of adult fish for resident species.

Floodplain

The lowland and relatively flat areas joining inland and coastal waters, including debris cones and flood-prone areas of offshore islands; including, at a minimum, that area subject to a 1 percent (100 year recurrence) or greater chance of flooding in any given year.

Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA)

Amended in 1976 by the National Forest Management Act.

Forest Development Road

A forest road under the jurisdiction of the Forest Service.

Forest Development Transportation System

Those facilities, forest development roads, trails, and air fields, in the transportation network and under Forest Service jurisdiction.

Forest Roads

A road wholly or partly within, or adjacent to, and serving the National Forest System and is necessary for the protection, administration, and use of the National Forest System and the use and development of its resources.

Forested Habitat

All areas with forest cover. Used in this EIS to represent a general habitat zone.

Gold Pin Watersheds

High quality sportfishing waters identified by the ADF&G, Sportfishing Division, as important to sport fishermen for a particular species.

Grabinsiki

A modified highlead cable logging system.

Group Selection Regeneration Method

Small groups of trees are removed to create new groups of uniform, balanced age classes within the stand. The openings are usually regenerated from seed of the surrounding trees. Age class regulation within groups is usually accomplished by removing unwanted trees when adjacent groups are harvested.

Habitat Capability

The number of healthy animals that a habitat can sustain.

Highlead Cable Logging

A method of transporting logs to a collecting point (landing) by using a power cable passing through a block fastened off the ground to lift the front ends of the logs clear off the ground while in transit.

Important Subsistence Use Area

Important Subsistence Use Areas include the "most-reliable" and "most often hunted" categories from the TRUCS survey and from subsistence survey data from ADF&G, the University of Alaska, and the Forest Service, Region 10. Important use areas include both intensive and extensive use areas for subsistence harvest of deer, furbearers, and salmon.

Indirect Employment

The jobs in service industries that are associated with or support a given activity. In the case of the long-term Timber Sale, indirect employment would include jobs with suppliers of logging and milling equipment.

Individual Tree Selection Regeneration Method

Single trees are removed throughout the stand, and new trees are established soon after each harvest occurs. Regeneration is normally from seed of the surrounding trees. Age class distribution of a stand is regulated by frequent harvesting which removes trees from all age classes during each entry.

Induced Employment

The jobs in the service or governmental sectors that result from increased population or purchases associated with given activity, such as the Long-term Sale Contract.

Inland Wetland Habitat

Lakes, beaver ponds, marsh lands, and associated grass/sedge meadows greater than 10 acres, plus a 500-foot buffer.

Inoperable Timber

Timber that cannot be harvested by any proven method because of potential resource damage, extremely adverse economic considerations, or physical limitations.

Interdisciplinary Team

Two or more natural resource planners who use relevant information to develop alternative design and comparison for a proposed project. The team insures the integrated use of environmental, social, and economic information is clearly presented so the best decision can be made.

Intermediate Stand Treatments

A stand management treatment which manipulates stand growth, composition, structure, or tree quality. Intermediate treatments include thinning, pruning, cleaning, weeding, liberation, release, improvement, salvage, and sanitation cutting to achieve different management objectives. These stand treatments do not attempt to obtain new tree regeneration, and they occur before the final regeneration harvest. Some treatments such as salvage cutting or commercial thinning result in the harvest of forest products.

Land Use Designation

The method of classifying land uses presented in the Tongass Land Management Plan (TLMP). Land uses and activities are grouped to define, along with a set of coordinating policies, a compatible combination of management activities. The following is a description of the four classifications:

LUD I: Wilderness areas.

LUD II: These lands are to be managed in a roadless state in order to retain their wildland character, but this designation would permit wildlife and fish habitat improvements, as well as primitive recreation facilities, and road development under special authorization.

LUD III: These lands may be managed for a variety of uses. The emphasis is on managing for uses and activities in a compatible and complimentary manner to provide the greatest combination of benefits.

LUD IV: These lands provide opportunities for intensive resource use and development, where the emphasis is primarily on commodity or market resources.

Large Woody Debris (LWD)

Any piece of relatively stable woody material having a small-end diameter of at least 10 centimeters and a length greater than one meter that intrudes into the stream channel.

Local Road

A forest road that connects terminal facilities with forest collector, forest arterial, or public highways. Usually forest local roads are single purpose transportation facilities and can either be long or short term in nature.

Log Transfer Facility

A facility that is used for transferring commercially harvested logs to and from a vessel or log raft. It is wholly or partially constructed in waters of the United States and location and construction are regulated by the 1987 Amendments to the Clean Water Act. Formerly termed terminal transfer facility.

Logging Camp

A temporary facility established to house industry and Forest Service personnel while timber harvest occurs in the area.

Management Area

An area of one or more VCUs for which management direction was written in the Tongass Land Management Plan. Two management areas, North Kuiu and East Kuiu, are included in this study area.

Mass Failure

The downslope movement of a block or mass of soil. This usually occurs under conditions of high soil moisture, and does not include individual soil particles displaced as surface erosion.

Mean Annual Increment

The total volume of a tree or stand divided by the stand age. The volume may be expressed in cubic feet or board feet per year.

Mitigation

Includes avoiding an impact altogether by not taking a certain action or part of an action; minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

Multiple Entry

More than one stand or land treatment activity during a rotation of a stand or area.

National Environmental Policy Act of 1969

An act declaring a National policy to encourage productive harmony between humans and their environment, to promote efforts which will prevent or eliminate damage to the environ-

6 Glossary

ment and the biosphere and stimulate the health and welfare of humans, to enrich the understanding of the ecological systems and natural resources important to the Nation and to establish a Council on Environmental Quality.

National Forest Management Act

A law passed in 1976 that amends the Forest and Rangeland Renewable Resources Planning Act and requires the preparation of Forest plans.

"No Action" Alternative

The most likely condition expected to exist in the future if current management direction would continue unchanged.

Non-Forest

Land that has never supported forests and lands formerly forested but now developed for non-forest uses.

Non-standard Harvest Operability

Timber which cannot be harvested with standard equipment and techniques but would require other systems including balloon or helicopter and skyline over 2600 feet.

Normal Harvest Operability

Timber which can be harvested with standard equipment and predominant techniques now in use such as high lead, A-frame, skyline of less than 2600 feet, and tractor.

Notice of Intent

The Notice of Intent (NOI) to produce an EIS for the North and East Kuiu Project was published in the *Federal Register* on June 15, 1900. A Revised NOI was published in the *Federal Register* on April 2, 1991.

Old-Growth

Ecosystems distinguished by old trees and related structural attributes.

Old-Growth Habitat

Wildlife habitat managed to maintain old-growth forest characteristics through the planning period.

Operability

Timber suitable for harvest and transport to a market.

Potential Yield

The potential yield for the next ten years is the maximum harvest that could be planned to achieve the optimum perpetual sustained-yield harvesting level attainable with intensive forestry on regulated areas considering productivity of the land, conventional logging technology, standard cultural treatments and interrelationships with other resources uses and the environment.

Precommercial Thinning

An intermediate stand treatment in even-aged stands which removes immature or undesirable trees to reduce competition so remaining trees can more fully utilize site potential and remain in a healthy condition.

Proportionality

The Tongass Timber Reform Act of 1990 states: "eliminate the practice of harvesting a disproportionate amount of old-growth timber by limiting the volume harvested over the rotation in volume classes 6 and 7, as defined in TLMP and supporting documents, so that the proportion of volume harvested in these classes within a contiguous management area does not exceed the proportion of volume currently represented by these classes within the management area".

Pulptimber Allotments (Pulp Allotments)

Basis mapped divisions of the Tongass National Forest that were established in the 1920's. Interior subdivisions for general and local use also relate to Forest Management direction developed in the 1920s (PULP-TIMBER RESOURCES OF SOUTHEASTERN ALASKA, by B. F. Heintzleman, Assistant District Forest, Alaska District, Forest Service; USDA, Miscellaneous Publication No. 41; Dec., 1928.) The earliest map on file, illustrating these Pulptimber Allotments, is dated May 12, 1947. It identifies Allotments A-1, B, C, D, E, F, G, and H. Section 1a of the APC contract states:

The sale area is comprised of Allotment B and H, Contingency Area in Allotment C and to the extent that the Forest Service may so designate additional cutting areas in Allotment A-1 under terms of this contract and to no further extent, such areas in Allotment A-1 as may be so designated. The boundaries of Allotments B, H, and A-1 and the Contingency Area in Allotment C are shown on Map A which is a part of this contract. MAP B of the Contract shows further subdivisions of Allotments B and H.

Recreation Opportunity Spectrum (ROS)

A system for planning and managing recreation resources that categorizes recreation opportunities into the following seven classes:

Primitive 1: A natural environment of fairly large size. Interaction between users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls.

6 Glossary

Primitive 2: A natural environment of fairly large size adjacent to saltwater. Interaction between users is very low, and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use may occur at infrequent levels.

Semi-Primitive Motorized: A natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed to minimize on-site controls and restrictions. Local roads used for other resource management activities may be present.

Semi-primitive Non-Motorized: A natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed to minimize on-site controls and restrictions. Use of local roads for recreational purposes is not allowed.

Roaded Natural: A natural-appearing environment with moderate evidence of the sights and sounds of man. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high with evidence of other users prevalent. Motorized use is allowed.

Roaded Modified: A natural environment that has been substantially modified particularly by vegetative manipulation. There is strong evidence of roads and/or highways. Frequency of contact is low to moderate.

Rural: A natural environment that has been substantially modified by development of structures, vegetative manipulation. Structures are readily apparent and may range from scattered to small dominant clusters. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high.

Recreation Places

Identified geographical areas having one or more physical characteristics that are particularly attractive to people in recreation activities. They may be beaches, streamside or roadside areas, trail corridors, hunting areas of the immediate area surrounding a lake, cabin site, or campground.

Redd

Nest made in gravel, consisting of a depression hydraulically dug by a fish for egg deposition and then refilled with gravel.

Retention Factor

The amount of commercial forest land removed from the timber base to protect other resource values. These factors are allowances available to draw upon when meeting other resource needs and are not fixed policies to be rigidly applied by the IDT or Forest Supervisors.

Right-of-way

The privilege which a person or persons may have of passing over the land of another.

Roads, Forest Development (or Specified)

A road, including related transportation facilities and appurtenances, shown on the Sale Area Map and listed in the Timber Sale Contract.

Roads, Temporary (or Spur)

Any short-lived road not intended to be a part of the forest development transportation system and not necessary for future resource management. After a temporary road has served its purpose, the timber sale operator will remove bridges and culverts, eliminate ditches, outslope roadbed, remove ruts and berms, effectively block the road to normal vehicular traffic, and build cross ditches and waterbars.

Rotation

The planned number of years (approximately 100 years in Alaska) between the time that a forest stand is regenerated and its final cutting at a specified stage of maturity.

RPA

Forest and Rangeland Renewable Resources Planning Act of 1974.

Salvage Cutting

Cutting primarily to utilize dead/down material resulting from windthrow and scattered poor risk trees that will not be marketable if left in the stand until the next scheduled harvest. Salvage sales must contain more than 50 percent by volume of dead, insect infested, or wind-thrown timber.

Sawlog

A log considered suitable in size and quality for producing sawn timber.

Seed Tree Regeneration Method

The objective of this regeneration method is to only leave trees which will provide seed to establish the new stand. Seed trees usually have good form, produce seed, are of the desired species, and are spaced to ensure adequate seed distribution. After the new seedlings are established the seed trees can be left or harvested.

Serialized Units

Serialized units are units which, while covered by an EIS, are not appraised but are reserved. If, because of changed market conditions, not enough appraised timber is available during the 5-Year Operating Period, the serialized units could be made available.

Shelterwood Regeneration Method

The objective of this regeneration method is to provide overstory shelter so young seedlings can become established. The seedlings can originate from planting or natural regeneration. Shelterwood trees are usually removed after the seedlings are established.

Silviculture

The branch of forestry involving the theory and practice of manipulating the establishment, composition, structure, and growth of forest vegetation. Silviculture involves the appropriate application of ecological, social, and economic principles of vegetative management to achieve resource management objectives and desired future forest conditions.

Silviculture Prescription

A written technical document which provides detailed implementation direction about methods, techniques, timing, and monitoring of vegetative treatments. A prescription is prepared after a preferred treatment alternative has been selected, but before the project is implemented. A prescription is prepared by a silviculturist who uses interdisciplinary input to best achieve established objectives, direction, and requirements for land managed by USDA, Forest Service.

Slash

Debris left over after a logging operation, ie, limbs, bark, broken pieces of logs.

Soil Hazard Areas

Mapped areas within which various soil hazards may be encountered. Hazards include mass failures and high sediment production during road construction.

Spawning Area

The available area in a stream course which is suitable for the deposition and incubation of salmon or trout eggs.

Species Diversity

The number of different species occurring in a location or under a similar environmental condition.

Stream Classification System

A means to categorize stream channels based on their fish production values. There are three stream classes on the Tongass National Forest. They are:

Class I: Streams with anadromous (fish ascending from oceans to breed in freshwater) or adfluvial (fish ascending from freshwater lakes to breed in streams) lake and stream fish habitat. Also included is the habitat upstream from migration barriers known to be reasonable enhancement opportunities for anadromous fish and habitat with high value resident sport fish populations.

Class II: Streams with resident fish populations and generally steep (often 6-15 percent) gradient (can also include streams from 0-5 percent gradient where no anadromous fish occur). These populations have limited sport fisheries values. These streams generally occur upstream of migration barriers or are steep gradient streams with other habitat features that preclude anadromous fish use.

Class III: Streams with no fish populations but have potential water quality influence on the downstream aquatic habitat.

Streamside Riparian

The area including a stream channel, lake, or estuary bed, the water itself, and the plants that grow in the water and on the land next to the water.

Stumpage

The value of timber as it stands uncut in terms of amount of value per thousand board feet.

Subsistence

The term "subsistence uses" means the customary and traditional uses by rural Alaska residents of wild renewable resources for direct, personal, or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resources taken for personal or family consumption; and for barter, or sharing for personal or family consumption; and for customary trade.

Succession

Changes over time in plant and animal populations or communities. Young, developing populations or communities usually change over time into perpetuating populations if environmental conditions do not change.

Suitability

An evaluation based upon a resource's potential use within proposed management activities.

Thousand Board Foot Measure

A method of timber measurement in which the unit is equivalent to 1,000 square feet of lumber one inch thick. It can be abbreviated Mbd, Mbm, or MBF.

Timber Sale Contract

Refers to the APC Long-Term Timber Sale Contract in the Supplemental EIS. The Timber Sale Contract is between the Alaska Pulp Corporation and the Forest Service, and is informally referred to by many as the 50 year contract.

Timtype

Timber type maps provide complete coverage of the Tongass National Forest. These maps were completed in 1978 and updated for the forest inventory between 1982 and 1984. In October, 1993, the timber type map information, along with the forest inventory, was identified as the source for the timber resource information needed for the Revised Forest Plan. TIMTYPE is the digitized timber type information stored in the computerized Geographic Information System (GIS).

Tongass Land Management Plan (TLMP)

The land allocation plan for the Tongass National Forest which serves to direct and coordinate further planning on the Forest as well as the uses carried on within the Forest on a day-to-day basis. TLMP provides management direction for a period of ten years.

Tongass Resource Use Cooperative Study (TRUCS)

A compilation of subsistence data for evaluating the effects of the Forest Service's action contemplated in the revision of the regional Tongass Land Management Plan.

Tongass Timber Supply Fund (TTSF)

Money established by Congress in ANILCA to make available for harvest 4.5 billion board feet from the Tongass National Forest per decade. The money is used to provide access to marginal timber stands and to allow for protection of other resource values.

Transportation Network

All existing and proposed roads, trails, air fields, and other transportation facilities wholly or partly within or adjacent to and serving the National Forests and other areas administered by the Forest Service or intermingled private lands.

Uneven-aged Stand Management

A forest stand management strategy which results in trees of at least 3 tree age classes. Relatively frequent harvest entries remove mature and immature trees either singly (individual tree selection) or in groups (group selection). Natural regeneration usually occurs soon after each harvest entry. Intermediate stand treatments are usually performed when the harvest entry occurs. Stand regulation or management is accomplished by manipulating stand density, stand structure, species composition, re-entry periods, and maximum tree age. These manipulation variables significantly increase the complexity of intensive forest management for uneven-aged stands. Biological diversity is generally greater within an uneven-aged stand than within an even-aged stand.

Utility Logs

Those logs which do not meet sawlog grade, but are suitable for production of firm useable pulp chips.

V-Notch

A relatively narrow, steep, V-shaped stream channel generally on steep, mountainous terrain.

Value Comparison Unit (VCU)

A distinct geographic area that generally encompasses a drainage basin containing one or more large stream systems. Boundaries usually follow easily recognizable watershed divides. These units were established on the Tongass National Forest to provide a common set of areas for which resource inventories could be conducted and resource value interpretations made.

Visual Quality Objective (VQO)

A desired level of scenic quality and diversity of natural features based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations of the characteristic landscape.

Inventory VQO: Derived through application of the USDA Visual Management System. Uses three elements to determine the inventory: Sensitivity levels, distance zones, and landscape variety class. Provides a benchmark and illustrates the optimum objective based on current use patterns and sensitivity.

Adopted VQO: The VQO to be achieved as a result of management direction identified in the approved forest plan. Adopted VQO's represent the visual resource objective for the Forest Land Management Plan period, normally 10 years. (FSH 2309.22, R10 Landscape Management Handbook.)

Preservation: Management activities are generally not allowed in this setting. The landscape is allowed to evolve naturally.

Retention: Management activities are not evident to the casual forest visitor.

Partial Retention: Management activities may be evident, but are subordinate to the characteristic landscape.

Modification: Management activities may dominate the characteristic landscape but will, at the same time, use naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed as middleground (1/4 to 5 miles from viewer).

Maximum Modification: Management activities may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

Volume

Stand volume based on standing net board feet per acres by Scribner Rule.

Volume Class

Average timber stand volume, given as thousand board feet per acre. The volume classes used in this EIS are: 8 to 20, 20 to 30, 30 to 50, and 50+ MBF/acre.

Wetland

Those areas that are inundated by surface or ground water frequently enough to support vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.

Wilderness

Any large tract of land uncultivated and uninhabited by human beings, where the earth and its biotic community is untrammelled by humans, where humans are the visitors who do not remain.

Wildlife Habitat

The locality where the species may be found and where all essentials for its development and existence are present.

Wildlife Habitat Management Unit (WHMU)

An area of wildlife habitat identified during the IDT process as having wildlife values of such importance that the habitat within the management area designated by the IDT is managed with wildlife as the primary resource value.

Windthrow (Blowdown)

Trees which the wind has blown over (windthrown) or broken the main stem (wind snap).

Chapter 7

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Chapter 8

Index

Index

A

- Affected Environment 3-160
- Air Quality 3-208
- Alaska National Interest Lands Conservation Act..... 3-90, 3-100, 3-102, 3-111, 3-112, 3-113, 3-114, 3-116, 3-120, 3-123, 3-143, 3-212
- Alaska Pulp Corporation (APC)..... 1-2, 1-7, 1-8, 1-9, 1-11, 1-15, 2-3, 2-41, 3-1, 3-6, 3-7, 3-8, 3-10, 3-28, 3-29, 3-123, 3-131, 3-144, 3-146, 3-203
- Alaska State Historic Preservation Officer (SHPO) 3-17
- Alecks Lake 1-14, 3-63, 3-70, 3-71, 3-74, 3-75, 3-78, 3-80, 3-155
- Alternative 1 2-12, 2-31, 2-32, 2-34, 2-36, 2-38, 2-41, 2-48, 2-49, 3-26, 3-71, 3-72, 3-73, 3-77, 3-106, 3-132, 3-140, 3-142, 3-150, 3-160, 3-161, 3-169, 3-193, 3-194, 3-197, 3-198
- Alternative 2 2-9, 2-13, 2-15, 2-16, 2-26, 2-31, 2-32, 2-33, 2-34, 2-36, 2-38, 2-41, 2-44, 2-48, 2-49, 3-18, 3-28, 3-42, 3-45, 3-46, 3-47, 3-54, 3-57, 3-71, 3-72, 3-73, 3-74, 3-75, 3-78, 3-87, 3-106, 3-132, 3-138, 3-142, 3-150, 3-155, 3-156, 3-157, 3-158, 3-159, 3-161, 3-194, 3-195, 3-196, 3-197, 3-198, 3-201
- Alternative 3 2-9, 2-10, 2-17, 2-18, 2-19, 2-20, 2-27, 2-31, 2-33, 2-35, 2-37, 2-39, 2-41, 2-44, 2-48, 2-49, 2-50, 3-18, 3-28, 3-29, 3-43, 3-45, 3-46, 3-47, 3-54, 3-71, 3-72, 3-73, 3-74, 3-75, 3-78, 3-86, 3-87, 3-106, 3-112, 3-132, 3-133, 3-139, 3-142, 3-150, 3-151, 3-152, 3-153, 3-155, 3-159, 3-160, 3-161, 3-169, 3-170, 3-194, 3-195, 3-196, 3-197, 3-198, 3-199, 3-200
- Alternative 4 2-10, 2-20, 2-22, 2-23, 2-24, 2-28, 2-31, 2-33, 2-35, 2-37, 2-39, 2-41, 2-44, 2-48, 2-49, 2-51, 3-18, 3-28, 3-29, 3-44, 3-45, 3-46, 3-47, 3-48, 3-54, 3-71, 3-72, 3-73, 3-75, 3-78, 3-87, 3-105, 3-106, 3-112, 3-132, 3-134, 3-140, 3-142, 3-150, 3-155, 3-158, 3-159, 3-161, 3-169, 3-194, 3-195, 3-196, 3-197, 3-198, 3-200
- Alternative Development..... 2-1
- Alvin Bay 2-4, 2-5, 2-36, 2-37, 2-49, 3-52, 3-61, 3-63, 3-71, 3-72, 3-74, 3-75, 3-78, 3-80, 3-86, 3-146, 3-155, 3-161, 3-163, 3-170
- ANILCA

See Alaska National Interest Land Conservation Act

APC

See Alaska Pulp Corporation

B

Bald Eagle..... 1-14, 1-17, 2-30, 2-38, 3-56, 3-174, 3-177,
3-183, 3-189, 3-190, 3-201, 3-207

Bay of Pillars 1-14, 1-15, 3-4, 3-9, 3-27, 3-53, 3-64, 3-65,
3-66, 3-67, 3-80, 3-92, 3-147, 3-158, 3-163, 3-205

Beach Fringe

See Wildlife Habitat

Best Management Practices..... 1-10, 2-3, 2-11, 2-14, 2-17, 2-21, 2-29, 2-32,
2-33, 2-36, 2-37, 2-49, 3-2, 3-41, 3-42, 3-43, 3-44, 3-46, 3-47, 3-48, 3-49, 3-168, 3-169, 3-170,
3-193, 3-196, 3-208, 3-209, 3-210

Biodiversity..... 3-143, 3-179, 3-201

Black Bear..... 1-13, 1-14, 2-36, 3-27, 3-62, 3-64, 3-96, 3-99,
3-100, 3-111, 3-112, 3-113, 3-122, 3-174, 3-178, 3-187, 3-188, 3-189, 3-198, 3-199, 3-200, 3-201,
3-206

Blowdown

See Windthrow

C

Caves..... 3-84, 3-85

Clean Water Act..... 1-10, 1-16, 1-17, 2-14, 2-17, 2-21, 2-36,
2-37, 2-49, 3-169

Clearcut Size 3-168

Commercial Forest Land 1-10, 2-46, 3-2, 3-28, 3-125, 3-127, 3-132,
3-144, 3-190

Cultural Sites..... 3-12

Cumulative Effects 3-1, 3-2, 3-21, 3-29, 3-30, 3-49, 3-79, 3-88,
3-89, 3-111, 3-120, 3-143, 3-144, 3-167, 3-203, 3-206, 3-209, 3-214

D

- Deer, Sitka Black-tailed..... 1-13, 1-14, 2-30, 2-34, 2-35, 2-36, 2-46, 2-50, 3-90, 3-91, 3-92, 3-93, 3-95, 3-96, 3-97, 3-98, 3-99, 3-100, 3-102, 3-105, 3-108, 3-109, 3-110, 3-113, 3-122, 3-174, 3-175, 3-177, 3-182, 3-183, 3-185, 3-186, 3-187, 3-191, 3-198, 3-199, 3-200, 3-206
- Desired Future Condition 1-8, 1-9, 3-210

E

- Economics..... 2-3, 2-11, 2-32, 2-42, 3-22, 3-27, 3-28
- Employment..... 1-2, 1-10, 1-12, 2-41, 2-42, 3-5, 3-7, 3-22, 3-23, 3-26, 3-27, 3-29, 3-96, 3-97
- Environmental Effects 3-17, 3-25, 3-41, 3-54, 3-70, 3-85, 3-100, 3-131, 3-161, 3-168, 3-193, 3-208
- Estuary Fringe
- See Wildlife Habitat*
- Even-Aged Management
- Clearcutting Regeneration Method..... 1-8, 2-5, 2-13, 2-17, 2-20, 3-83, 3-135, 3-136, 3-163, 3-168, 3-188, 3-210
- Shelterwood Regeneration Method 3-135
- Existing Visual Condition..... 3-148, 3-149, 3-160
- Existing Visual Condition (EVC)..... 1-13, 3-148, 3-149, 3-160, 3-161

F

- Fall Dog Creek..... 2-11, 2-13, 3-32, 3-33, 3-69, 3-78, 3-113, 3-114, 3-172, 3-205
- Findings
- See Subsistence Findings*
- Fish Habitat..... 1-10, 1-12, 2-3, 2-29, 2-32, 2-44, 3-27, 3-31, 3-32, 3-33, 3-39, 3-41, 3-45, 3-46, 3-47, 3-49, 3-89, 3-92, 3-115, 3-122, 3-165, 3-166, 3-167, 3-168, 3-169, 3-208

- Fisheries 1-8, 1-17, 2-4, 2-10, 2-14, 2-17, 2-21, 2-43, 3-6, 3-25, 3-27, 3-31, 3-40, 3-53, 3-54, 3-116, 3-165, 3-167, 3-168, 3-191, 3-215
- Fishing, Commercial 2-42, 3-6, 3-7, 3-27, 3-53, 3-99, 3-100, 3-151, 3-158
- Floodplains..... 3-84, 3-88, 3-89
- Forest Plan
- See Tongass Land Management Plan*
- Forest Products 1-2, 1-7, 1-10, 2-4, 2-17, 2-21, 3-5, 3-135, 3-143
- Forested Habitat
- See Wildlife Habitat*
- Furbearers 3-110, 3-113, 3-122, 3-178, 3-189
- G**
- Goose, Vancouver Canada 3-116, 3-190, 3-207
- Goshawk 2-11, 2-12, 2-30, 3-182, 3-191, 3-192, 3-202
- Group Selection
- See Uneven-Aged Management*
- H**
- Hearings
- See Subsistence Hearings*
- I**
- Insects and Disease 3-125, 3-127, 3-188, 3-189
- Issues..... 1-1, 1-12, 1-14, 2-1, 2-2, 2-4, 2-9, 2-30, 2-40, 2-51, 3-1, 3-59

J

Jobs

*See Employment***K**

- Kadake 2-10, 2-11, 2-13, 2-21, 2-30, 2-46, 2-50, 3-9, 3-32, 3-33, 3-34, 3-36, 3-40, 3-48, 3-61, 3-64, 3-67, 3-68, 3-69, 3-78, 3-81, 3-84, 3-92, 3-100, 3-150, 3-151, 3-160, 3-164, 3-166, 3-167, 3-168, 3-170, 3-171, 3-180, 3-201, 3-202, 3-205
- Kadake Bay 2-10, 2-21, 2-30, 2-46, 3-64, 3-67, 3-68, 3-69, 3-92, 3-100, 3-150, 3-151, 3-160, 3-164
- Kadake Creek 2-11, 2-13, 2-21, 3-9, 3-32, 3-33, 3-36, 3-40, 3-48, 3-64, 3-69, 3-78, 3-81, 3-85, 3-160, 3-167, 3-170, 3-205
- Kayaking 2-17, 2-21, 3-27, 3-63, 3-64, 3-65, 3-66, 3-67, 3-68, 3-69, 3-74, 3-75, 3-79, 3-80, 3-81, 3-146, 3-156
- Keku Islets 3-62, 3-69, 3-70, 3-78, 3-79, 3-150, 3-162
- Klawock 3-12, 3-92, 3-93, 3-95, 3-96, 3-97, 3-101, 3-105, 3-106, 3-108
- Kupreanof 3-7, 3-9, 3-52, 3-92, 3-95, 3-96, 3-109, 3-120, 3-146, 3-180, 3-193

L

- Lake Buffers 2-29
- Landslide 1-13, 3-82, 3-83, 3-85, 3-124, 3-125, 3-130, 3-165
- Log Transfer Facility 1-7, 1-9, 2-10, 2-13, 2-17, 2-20, 2-21, 2-32, 2-33, 2-44, 3-9, 3-10, 3-18, 3-28, 3-50, 3-51, 3-54, 3-55, 3-56, 3-57, 3-63, 3-66, 3-74, 3-75, 3-80, 3-81, 3-111, 3-112, 3-113, 3-115, 3-117, 3-151, 3-161, 3-163, 3-194, 3-211
- Logging Camp 1-7, 2-10, 2-32, 2-41, 3-7, 3-8, 3-9, 3-10, 3-11, 3-54, 3-63, 3-67, 3-74, 3-75, 3-80, 3-113, 3-115, 3-116, 3-117, 3-188, 3-211
- LTF

See Log Transfer Facility

M

- Management Direction 1-8
- Management Indicator Species (MIS)..... 3-31, 3-48, 3-49, 3-182, 3-183, 3-192, 3-193, 3-197, 3-210
- Marbled Murrelet..... 2-11, 2-30, 3-182, 3-191, 3-192, 3-202
- Marine Environment..... 1-13, 2-13, 2-17, 2-21, 2-44, 3-27, 3-50, 3-51, 3-57
- Marine Mammals..... 3-93, 3-99, 3-111, 3-118
- Marten..... 1-14, 2-36, 2-50, 3-110, 3-111, 3-174, 3-177, 3-182, 3-183, 3-184, 3-185, 3-187, 3-188, 3-198, 3-199, 3-200, 3-206
- Mills 1-3, 1-14, 2-9, 2-13, 2-41, 3-6, 3-8, 3-22, 3-23, 3-26, 3-28, 3-40, 3-97, 3-100, 3-213

MIS

See Management Indicator Species

- Mitigation..... 1-11, 2-20, 2-29, 2-30, 2-44, 3-21, 3-122, 3-129, 3-155, 3-162, 3-163, 3-208, 3-209, 3-210, 3-211
- Monitoring 2-14, 2-17, 2-21, 2-30, 2-37, 3-19, 3-21, 3-45, 3-48, 3-51, 3-55, 3-57, 3-89, 3-166, 3-169, 3-170, 3-209

N

No Action Alternative

See Alternative 1

- No Name Bay 2-10, 2-17, 2-21, 2-33, 2-36, 2-37, 2-44, 2-49, 3-8, 3-10, 3-18, 3-27, 3-50, 3-51, 3-52, 3-54, 3-57, 3-63, 3-66, 3-67, 3-74, 3-75, 3-78, 3-80, 3-111, 3-112, 3-113, 3-115, 3-116, 3-117, 3-119, 3-146, 3-156, 3-157, 3-161, 3-163, 3-194

O

- Old-Growth Habitat..... 2-10, 2-13, 2-14, 2-17, 2-21, 2-24, 2-25, 2-26, 2-27, 2-28, 2-29, 2-38, 3-179, 3-180, 3-197, 3-201, 3-205

P

Petersburg 1-2, 2-9, 3-5, 3-6, 3-7, 3-10, 3-52, 3-92, 3-93, 3-95, 3-97, 3-98, 3-101, 3-105, 3-106, 3-108, 3-123, 3-192

Plant Communities 3-124

Plant Succession 1-9, 2-4, 3-2, 3-96, 3-100, 3-124, 3-125, 3-126, 3-127, 3-175, 3-184, 3-203

Point Baker 3-6, 3-7, 3-52, 3-92, 3-93, 3-95, 3-98, 3-101, 3-103, 3-105, 3-106, 3-108, 3-109, 3-111, 3-112, 3-113, 3-115, 3-117, 3-123

Port Alexander 3-7, 3-92, 3-93, 3-95, 3-98, 3-99, 3-101, 3-105, 3-106, 3-108, 3-117, 3-123

Port Camden 1-9, 2-10, 2-13, 2-17, 2-21, 2-34, 2-35, 2-36, 2-37, 2-46, 2-49, 3-9, 3-12, 3-32, 3-33, 3-40, 3-50, 3-51, 3-53, 3-63, 3-64, 3-66, 3-71, 3-72, 3-73, 3-74, 3-78, 3-81, 3-92, 3-100, 3-110, 3-146, 3-147, 3-158, 3-159, 3-161, 3-164

Port Protection 3-6, 3-7, 3-92, 3-93, 3-95, 3-98, 3-101, 3-105, 3-106, 3-108, 3-112, 3-115, 3-117

Preferred Alternative 2-51

See also Alternative 4

Proportionality

See TTRA

See Timber, Volume Class

Proposed Action..... 1-3, 1-7, 1-14, 2-1, 2-5, 3-27, 3-88, 3-101, 3-102, 3-115, 3-117, 3-174, 3-175, 3-193, 3-208, 3-211, 3-212, 3-213, 3-214

Public Comments..... 2-5, 3-116, 3-120, 3-152, 3-155, 3-156

Public Input..... 1-12, 2-5

R

Recreation..... 1-2, 1-8, 1-10, 1-11, 1-13, 2-4, 2-13, 2-17, 2-21, 2-30, 2-34, 2-35, 2-45, 3-5, 3-6, 3-22, 3-25, 3-27, 3-30, 3-59, 3-60, 3-61, 3-62, 3-63, 3-64, 3-65, 3-66, 3-67, 3-69, 3-70, 3-71, 3-72, 3-73, 3-74, 3-75, 3-76, 3-77, 3-78, 3-79, 3-80, 3-81, 3-146, 3-150, 3-151, 3-152, 3-153, 3-155, 3-157, 3-158, 3-161, 3-163, 3-164, 3-174, 3-177, 3-186, 3-205, 3-208, 3-209, 3-210, 3-214

Recreation Opportunity Spectrum..... 3-59, 3-60, 3-61, 3-70, 3-72, 3-76

- Recreation Places..... 1-13, 2-35, 3-59, 3-61, 3-62, 3-63, 3-64, 3-65, 3-72, 3-73, 3-74, 3-75
- Reid Bay 1-10, 2-21, 2-36, 2-37, 2-49, 3-52, 3-63, 3-71, 3-74, 3-75, 3-78, 3-80, 3-98, 3-99, 3-146, 3-155, 3-161, 3-163
- Reserve Trees..... 3-156
- Riparian Habitat
- See Wildlife Habitat*
- River Otter 1-14, 2-36, 3-110, 3-177, 3-178, 3-183, 3-189, 3-201, 3-206
- Road Crossings 1-10, 1-12, 2-32, 2-44, 3-39, 3-47, 3-49
- Roads..... 1-3, 1-7, 2-3, 2-10, 2-11, 2-13, 2-17, 2-20, 2-29, 2-31, 2-34, 2-35, 2-43, 2-46, 3-4, 3-8, 3-9, 3-17, 3-25, 3-29, 3-39, 3-47, 3-56, 3-64, 3-67, 3-70, 3-74, 3-75, 3-79, 3-80, 3-82, 3-85, 3-86, 3-89, 3-112, 3-116, 3-117, 3-137, 3-146, 3-153, 3-168, 3-189, 3-202, 3-208, 3-209, 3-211
- Rocky Pass..... 2-50, 3-9, 3-27, 3-59, 3-63, 3-64, 3-66, 3-67, 3-71, 3-146, 3-164, 3-180, 3-201, 3-202, 3-205
- ROS
- See Recreation Opportunity Spectrum*
- Rowan Bay 1-7, 1-8, 1-9, 2-13, 2-17, 2-21, 2-32, 2-34, 2-41, 2-44, 2-45, 2-49, 3-7, 3-9, 3-10, 3-11, 3-26, 3-50, 3-51, 3-53, 3-54, 3-57, 3-60, 3-63, 3-64, 3-67, 3-71, 3-79, 3-80, 3-92, 3-112, 3-113, 3-114, 3-115, 3-116, 3-117, 3-147, 3-150, 3-153, 3-154, 3-163, 3-188, 3-191, 3-192
- S**
- Saginaw Bay 1-10, 2-4, 2-5, 2-13, 2-21, 2-30, 2-32, 2-44, 2-46, 3-9, 3-10, 3-12, 3-50, 3-51, 3-53, 3-57, 3-62, 3-65, 3-66, 3-70, 3-71, 3-73, 3-79, 3-84, 3-146, 3-151, 3-162, 3-165
- Seclusion Harbor 3-27, 3-60, 3-63, 3-65, 3-66, 3-81, 3-111, 3-146, 3-147, 3-157, 3-163
- Security Bay..... 2-10, 2-11, 2-13, 2-21, 2-30, 2-36, 2-46, 2-49, 3-9, 3-12, 3-32, 3-33, 3-60, 3-62, 3-65, 3-66, 3-68, 3-69, 3-78, 3-79, 3-80, 3-113, 3-114, 3-116, 3-151, 3-152, 3-162, 3-165, 3-167, 3-201, 3-205
- Sedimentation 1-13, 2-36, 2-37, 2-49, 3-46, 3-47

- Sitka 1-14, 2-32, 2-36, 2-50, 3-5, 3-6, 3-8, 3-10, 3-23, 3-84, 3-92, 3-93, 3-95, 3-99, 3-100, 3-101, 3-103, 3-105, 3-106, 3-108, 3-109, 3-123, 3-124, 3-125, 3-127, 3-130, 3-135, 3-136, 3-174, 3-182, 3-183, 3-185, 3-200, 3-206
- Sitka Spruce 3-84, 3-124, 3-125, 3-127, 3-130, 3-135, 3-136, 3-152
- Soil 1-9, 1-13, 2-2, 2-3, 2-11, 2-13, 2-29, 2-34, 2-35, 2-45, 2-46, 2-49, 3-41, 3-82, 3-83, 3-84, 3-85, 3-86, 3-87, 3-89, 3-124, 3-125, 3-126, 3-127, 3-130, 3-136, 3-137, 3-143, 3-150, 3-153, 3-156, 3-162, 3-165, 3-167, 3-168, 3-169, 3-178, 3-205, 3-208, 3-209, 3-210, 3-211
- Soil Hazard Class 1-13, 3-83, 3-85, 3-86
- Soil Quality Standards 2-45, 3-82, 3-85, 3-89
- Stream Buffer 1-12, 1-15, 2-3, 2-13, 2-17, 2-21, 3-41, 3-45, 3-49, 3-129, 3-144, 3-212
- Stream Classes 3-34
- Class I 1-12, 2-13, 2-17, 2-21, 2-29, 2-32, 2-33, 2-44, 2-48, 3-33, 3-34, 3-35, 3-36, 3-37, 3-38, 3-39, 3-41, 3-42, 3-43, 3-44, 3-45, 3-46, 3-47, 3-48, 3-49, 3-115, 3-128, 3-129, 3-142, 3-144, 3-169, 3-170, 3-196, 3-201, 3-205, 3-212, 3-213
- Class II 2-13, 2-17, 2-21, 2-29, 2-44, 2-48, 3-33, 3-34, 3-36, 3-37, 3-38, 3-39, 3-41, 3-42, 3-43, 3-44, 3-45, 3-46, 3-47, 3-48, 3-115, 3-128, 3-129, 3-142, 3-144, 3-196, 3-205, 3-213
- Class III 2-13, 2-17, 2-21, 3-33, 3-34, 3-41, 3-46, 3-47, 3-48, 3-144, 3-196
- Stream Temperature 1-13, 3-165, 3-167, 3-168, 3-170
- Subsistence Findings 3-102, 3-103, 3-109, 3-113, 3-184
- Subsistence Hearings 1-12, 2-5, 3-101, 3-112, 3-114, 3-123

T

- Tebenkof Bay 3-8, 3-12, 3-14, 3-27, 3-63, 3-64, 3-65, 3-66, 3-67, 3-68, 3-70, 3-71, 3-74, 3-75, 3-79, 3-80, 3-163
- Thinning 2-30, 3-10, 3-122, 3-143, 3-203
- Threatened and Endangered Species 2-11, 2-12, 3-3, 3-191, 3-215
- Three Mile Arm 3-9, 3-81, 3-98, 3-111, 3-146, 3-158, 3-164

Timber..... 1-1, 1-2, 1-7, 1-8, 1-9, 1-10, 1-11, 1-12, 1-13, 1-14, 1-15, 1-16, 1-17, 2-2, 2-3, 2-5, 2-9, 2-10, 2-11, 2-13, 2-15, 2-16, 2-17, 2-18, 2-19, 2-20, 2-21, 2-22, 2-23, 2-24, 2-29, 2-34, 2-37, 2-40, 2-41, 2-42, 2-43, 2-44, 2-45, 2-46, 2-47, 2-48, 2-49, 2-50, 3-2, 3-3, 3-5, 3-6, 3-7, 3-8, 3-9, 3-10, 3-18, 3-19, 3-21, 3-22, 3-23, 3-24, 3-25, 3-27, 3-28, 3-29, 3-30, 3-31, 3-34, 3-35, 3-37, 3-41, 3-46, 3-49, 3-54, 3-55, 3-57, 3-59, 3-63, 3-69, 3-78, 3-79, 3-80, 3-81, 3-82, 3-85, 3-86, 3-88, 3-89, 3-97, 3-101, 3-102, 3-103, 3-104, 3-109, 3-110, 3-111, 3-112, 3-114, 3-115, 3-117, 3-118, 3-119, 3-120, 3-121, 3-122, 3-124, 3-125, 3-128, 3-129, 3-130, 3-131, 3-132, 3-134, 3-140, 3-141, 3-142, 3-143, 3-144, 3-146, 3-149, 3-153, 3-155, 3-158, 3-160, 3-161, 3-162, 3-163, 3-164, 3-166, 3-167, 3-168, 3-169, 3-175, 3-176, 3-177, 3-178, 3-179, 3-184, 3-186, 3-189, 3-190, 3-191, 3-192, 3-193, 3-197, 3-201, 3-203, 3-204, 3-205, 3-206, 3-207, 3-208, 3-209, 3-210, 3-211, 3-212, 3-213

Volume Class..... 1-8, 2-11, 2-47, 2-48, 3-28, 3-128, 3-129, 3-140, 3-142, 3-144, 3-190

TLMP

See Tongass Land Management Plan

Tongass Land Management Plan..... 1-2, 1-3, 1-4, 1-7, 1-8, 1-9, 1-14, 1-15, 2-2, 2-3, 2-10, 2-11, 2-12, 2-24, 2-25, 2-29, 2-48, 3-2, 3-4, 3-6, 3-23, 3-29, 3-32, 3-59, 3-69, 3-70, 3-72, 3-78, 3-79, 3-92, 3-101, 3-102, 3-108, 3-120, 3-121, 3-126, 3-128, 3-129, 3-130, 3-134, 3-136, 3-142, 3-143, 3-162, 3-163, 3-164, 3-174, 3-175, 3-177, 3-178, 3-182, 3-205, 3-206

Tongass Timber Reform Act 1-2, 1-3, 1-8, 1-9, 1-11, 1-15, 1-17, 2-5, 2-9, 2-11, 2-13, 2-17, 2-21, 2-29, 2-34, 2-35, 2-47, 2-48, 3-31, 3-41, 3-49, 3-63, 3-114, 3-121, 3-128, 3-129, 3-134, 3-140, 3-141, 3-142, 3-143, 3-144, 3-178, 3-193, 3-196, 3-201, 3-213

Transportation..... 1-7, 1-8, 1-10, 2-2, 2-10, 2-17, 2-21, 2-43, 3-4, 3-8, 3-9, 3-28, 3-29, 3-50, 3-67, 3-79, 3-90, 3-96, 3-97, 3-150, 3-213

TTRA

See Tongass Timber Reform Act

U

Uneven-Aged Management..... 1-8, 2-5, 2-17, 2-20, 3-125, 3-135

Group Selection Regeneration Method 2-5, 2-13, 2-20, 2-30, 2-38, 2-39, 2-50, 3-135, 3-136, 3-202

Unit Pool 2-3, 2-9

V

Visual Condition, Future..... 3-160

Visual Quality Objectives.....	2-13, 3-147, 3-149, 3-151, 3-152, 3-153, 3-155, 3-157, 3-158, 3-159, 3-160, 3-161
Maximum Modification.....	3-147, 3-158
Modification.....	3-147, 3-148, 3-151, 3-155, 3-158, 3-159, 3-161
Partial Retention.....	3-147, 3-151, 3-160
Retention	3-147, 3-148, 3-151, 3-157, 3-160

Visual Resource	2-13, 2-17, 2-21, 2-36, 3-146
-----------------------	-------------------------------

Visual, Sensitivity Levels	3-146, 3-147
----------------------------------	--------------

Volume Class

See Timber

W

Washington Bay	3-63, 3-80, 3-99, 3-152, 3-153, 3-162
----------------------	---------------------------------------

Water Quality	1-10, 1-13, 1-16, 2-14, 2-17, 2-21, 2-29, 2-36, 2-49, 3-33, 3-48, 3-49, 3-84, 3-89, 3-136, 3-165, 3-167, 3-168, 3-169, 3-210
---------------------	--

Waterfowl.....	1-13, 3-62, 3-63, 3-64, 3-67, 3-90, 3-92, 3-99, 3-100, 3-111, 3-113, 3-178, 3-190
----------------	---

Watershed.....	1-3, 1-13, 2-4, 2-5, 2-11, 2-13, 2-14, 2-17, 2-21, 2-49, 3-33, 3-39, 3-40, 3-48, 3-49, 3-84, 3-165, 3-167, 3-168, 3-170, 3-179, 3-209
----------------	---

Western Hemlock.....	1-10, 3-84, 3-124, 3-125, 3-126, 3-127, 3-130, 3-135, 3-152
----------------------	---

Wetlands.....	3-84, 3-87, 3-88, 3-111, 3-190
---------------	--------------------------------

Wild and Scenic Rivers	2-10, 2-11, 2-13, 3-59, 3-69, 3-78, 3-205
------------------------------	---

Wilderness.....	1-2, 1-4, 1-9, 1-11, 1-14, 2-5, 2-39, 2-48, 3-4, 3-6, 3-8, 3-63, 3-64, 3-65, 3-66, 3-67, 3-68, 3-70, 3-71, 3-74, 3-75, 3-79, 3-80, 3-129, 3-142, 3-144, 3-163, 3-180, 3-202, 3-205, 3-211
-----------------	---

Wilderness, Kuiu	3-4, 3-65, 3-180, 3-202, 3-205
------------------------	--------------------------------

Wilderness, Tebenkof Bay	3-8, 3-63, 3-64, 3-65, 3-67, 3-68, 3-70, 3-71, 3-74, 3-75, 3-79, 3-80, 3-163
--------------------------------	--

Wildlife Habitat

Beach Fringe	3-176, 3-177, 3-194, 3-204
--------------------	----------------------------

- Estuary Fringe 3-176, 3-177, 3-178, 3-195, 3-204
- Forested Habitat 3-176, 3-177, 3-178, 3-197, 3-203, 3-204
- Riparian Habitat 2-11, 2-14, 2-17, 2-21, 2-32, 3-34, 3-35,
3-122, 3-176, 3-177, 3-178, 3-183, 3-193, 3-196, 3-204, 3-205
- Windthrow 2-2, 2-3, 3-83, 3-125, 3-126, 3-143, 3-166
- Wolf, Gray..... 2-49, 3-17, 3-71, 3-136, 3-169, 3-183, 3-186,
3-190, 3-191
- Wrangell..... 2-32, 3-5, 3-6, 3-8, 3-10, 3-92, 3-93, 3-95,
3-97, 3-100, 3-101, 3-105, 3-106, 3-108, 3-117, 3-123, 3-192

Y

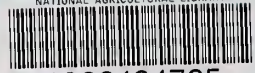
- Yarding Methods..... 2-3, 3-137

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